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ANNUAL REPORTS AND PROCEEDINGS

OF THE

BELFAST NATURALISTS' FIELD CLUB

For the Year ending the 31st March, 1894.

(THIRTY FIRST YEAR.)

SERIES II.

VOLUME IV.



PART I.

1893-4.

Belfast :

PRINTED FOR THE CLUB
BY ALEXANDER MAYNE & BOYD, 2 CORPORATION STREET,
PRINTERS TO QUEEN'S COLLEGE, BELFAST.

1894.

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REPORT.

The Committee of the Belfast Naturalists' Field Club now lay before the members their thirty-first Annual Report. The past year has been one of continued success, showing a large increase in membership and in work done under the Club's auspices. At the end of last year the membership stood at 404; it has now reached 461, after allowing for removals by death and other causes, the largest number ever reached since the Club's foundation.

The Summer Session was one of great interest and instruction; it included one three-day excursion, five whole day excursions, and one half-day excursion. On the occasion of the three-day excursion to Newry and Carlingford an alliance was formed with the Dublin Field Club, which, it is trusted, will be a permanent one, and it is hoped that similar re-unions may be arranged each summer, as such are found profitable to both Clubs.

The following is a list of the excursions :—

Antrim and Moylinne	..	...	20th May.
Lower Ards	...	...	10th June.
Black Head	...	...	24th June.
Dundalk and Carlingford	...	...	4th, 5th, and 6th July.
Ballynahinch	...	...	29th July.
Giant's Causeway	...	...	26th August.
Loughbrickland	...	...	16th September.

The attendance at these excursions varied from fifty-three at Giant's Causeway to fourteen at Dundalk. In connection with these excursions it is hoped that more practical work will be done at them, and that individual members will strive to do something to advance scientific knowledge, so that a pleasant trip in the country may not be considered the chief end of our

field days. The best thanks of the Club are due to Rev. W. S. Smith, for Antrim ; B. D. Wise, C.E., for Blackhead ; Major Hall, T. M. H. Flynn, and H. Barcroft, J.P., and Mrs. Barcroft, for Newry ; Rev. Father Quail, for Ballynahinch ; W. A. Traill, C.E., for Giant's Causeway ; and J. Temple Reilly, J.P., for Scarva.

The Winter Session was opened with a conversazione in the Exhibition Hall, Botanic Gardens, which was well attended and much enjoyed by all present. The winter meetings, which were more numerous than usual, were as follows :—

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| 21st Nov. | 1. Opening remarks by President. |
| | 2. "Irish Fairy Lore."—W. B. Yeats, of Dublin. |
| | 3. "A Few Children's Games."—Miss Clara Patterson, Member. |
| | 4. Report of Ethnographical Committee.—W. H. Patterson, M.R.I.A., Member. |
| 20th Dec. | "What is a Stone?"—William Gray, M.R.I.A., Member. |
| 16th Jany. | 1. "Relative Antiquity of Rath, Cromleac, and Tumulus."—John M. Dickson, Member. |
| | 2. "Pre-Historic and Historic Forts in the City and Vicinity of Belfast."—Francis Joseph Bigger, Hon. Sec. |
| | 3. "Notes on Forts in the Townland of Erenagh"—John Russell, C.E., Member. |
| 20th Feby. | 1. "Notes on the Ancient Church of Lisnagarra."—John Cardwell. |
| | 2. "Botanizing in County Dublin."—R. Lloyd Praeger, M.R.I.A., Member. |
| | 3. "Localities for Lepidoptera near Belfast."—Charles N. Watts, F.I.C., Member. |
| | 4. "Lepidoptera of Enniskillen."—Lieut.-Col. Partridge. |
| 20th March | Microscopical Evening. |
| 29th " | "Our Holy Wells."—William Gray, M.R.I.A., Member. |
| 10th April | "Pagan Cemeteries and Burial Customs of Ireland."—Geo. Coffey, M.R.I.A. |
| 17th " | 1. Report of the Celtic Class.—P. J. O'Shea, Member. |
| | 2. "Homer in Irish."—T. Ward, Member. |
| | 3. Address on the Irish Language.—J. St. Clair Boyd, M.D., Member. |
| | 4. Tale in Irish.—J. G. Foley, Member. |
| | 5. Local Celtic Topography.—Francis Joseph Bigger, Hon. Sec. |
| | 6. Tale in Irish.—M. Griffin, Member. |
| | 7. Ballad, "Lament for O'Cathan."—Miss Alice M. Milligan. |
| | 8. Prose Selection.—E. Morrissey, Member. |
| 25th April | Annual Meeting. |

The average attendance at the Winter Meetings was better than on any former year. On the microscopical evening the large room and the library were both filled to overflowing, whilst on evenings of the lectures by W. B. Yeats, Wm. Gray,

M.R.I.A. ; and George Coffey, M.R.I.A., the room was quite crowded.

The formation of a Geological Committee, with Miss S. M. Thompson as secretary, will doubtless assist practical work, and further advance the reputation of the Club in this important branch of science (see Report, page 113). During the Winter Session a course of lectures on geology was delivered by Prof. Grenville Cole, of Dublin, which proved a great success, both financially and as a stimulus in the investigation of local geology.

The Microscopical Section has been re-organised, with Dr. J. St. Clair Boyd as secretary, so it may be anticipated that a new impetus will be given to this important part of the Club's work and that good results will follow.

The class formed for the study of the Irish language was continued under the instruction of our member, P. J. O'Shea, who kindly attended every Monday evening during the winter. This class was a success, and has done good work in giving to many an introductory knowledge of their native tongue. It is to be hoped that Mr. O'Shea, to whom the Club are very much indebted, will continue this class next winter.

On each evening of meeting, for the convenience of members, tea was provided under the superintendence of Mrs. Leslie, Miss Andrew, and Miss Wright, to whom the Committee now wish to return their best thanks for the great trouble they took in this matter.

The Club's albums have been largely augmented during the year by the kind contributions of members, which, it is hoped, will be increased during the coming years, so that our collection of photographs may be a complete and permanent record of all subjects of interest in our district.

The following are the reports of the judges appointed to examine the collections sent in by members in competition for Club's prizes :—

Prize II.—This prize is competed for by R. Lloyd Praeger, M.R.I.A., with a good collection, which comprises 150 species

of Irish plants mounted on 175 sheets, some of the plants being represented by more than one specimen. This collection, which was designed to illustrate the Flora of Eastern Ireland, includes some plants new to the Irish Flora, and several which are additions to districts 3, 4, and 5. It is well worthy of the prize, which is accordingly awarded to Mr. Praeger.

Prize XX.—To W. Hanna, M.A., for his neatly prepared and well mounted slides of structural points of Echinodermata and Cryptograms.

Prize XXVIII.—In competition for this prize, R. Lloyd Praeger has sent in a collection which includes many rare plants, a large proportion of which are recent additions to our local botanical lists. One—*Carex rhynchophysa*—has not been found anywhere in the British Islands except in Mr. Praeger's Armagh station. Seven of the specimens represent additions to district 10 of the Cybele Hibernica. Four are new to the county Flora of Down, three to Antrim, and one to Derry. The conditions governing this competition are amply fulfilled by this collection, and I have pleasure in reporting that Mr. Praeger is entitled to this prize.

S. A. STEWART.

We have carefully examined the sets of micro slides submitted in competition for Prizes No. XX., XXI., and XXII., and beg to report as follows:—All the collections were of high scientific merit and in strict accordance with the conditions framed by the Committee, and the prizes offered we award as follows—

Prize XXI.—We have pleasure in awarding to William A. Firth for his very superior slides of grouped diatoms, &c., a set remarkable for the amount of manipulated skill displayed in each separate slide, as well as in the taste and general excellence of the entire set.

Prize XXII.—To John O. Campbell, B.A., B.E., for his micro-photographs of geological slides; several of them are useful examples for demonstrative purposes.

WM. GRAY.

WM. SWANSTON.

The Committee regret that there is not more competition for the prizes offered, and would point out to the members, especially the younger ones, the great desirability of forming collections as a means to acquiring scientific information, and trust that all, or nearly all, the prizes offered will be competed for in the coming year.

Next year your Committee hope to have provided in the Museum suitable rooms, permanently at the service of the members. The want of a fixed habitation has long been felt, a place where the members can meet at all times, where their books and instruments can be kept ready for constant use, with a work-room for practical investigation. These necessary adjuncts to the successful carrying on of the work of the Club, your Committee hope shortly to have arranged.

Your Committee beg to return their best thanks to the local press for the lengthened reports given to their proceedings from time to time ; also to the local railway companies for the advantageous terms given on the occasion of excursions.

FRANCIS JOSEPH BIGGER, *Hon. Secretary.*

THE TREASURER IN ACCOUNT WITH THE BELFAST NATURALISTS' FIELD CLUB.

Dr.

Statement of Income and Expenditure for the Year 1893-94.

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To Balance	£18 15 1	By Expenses of the Social Meeting	...	£26 11 0
" Subscriptions	97 0 0	" Printing Proceedings	...	25 12 9
" Tickets for Conversazione	...	13 13 0	" Stationery, Printing, and Advertising	...	21 10 11
" Sales of Guide	...	0 2 6	" Meteorological Report	...	1 0 0
" Do. Proceedings	...	2 10 6	" Expenses of Lectures	...	2 0 8
" Do. Flora	...	0 4 6	" Rent of Museum	...	6 6 0
" Mr. Gray's Contribution to Cost of Proceedings	...	...	" Photographic Albums	...	8 8 0
(for illustrating his paper)	...	3 0 0	" Collector's Commission	...	5 13 3
" Gain on Excursions	...	5 4 0	" Prizes Awarded	...	2 10 0
" Gain on Teas	...	0 15 0	" GENERAL EXPENSES, viz.:—	...	...
			Postages	£22 8 6	
			Insurance	1 5 0	
			Incidentals	7 8 9	
				—	31 2 3
			" Balance	...	0 8 11
		£141 4 7			£141 4 7

Audited and found correct.

S. A. STEWART.

W. H. PHILLIPS, Treasurer.

PROCEEDINGS.



SUMMER SESSION.

EXCURSIONS.



20th May.

ANTRIM AND THE MOY-LINNE VALLEY.

THE first excursion of the year was to Antrim and the Moylinne Valley, when a pleasant day was spent with enjoyable weather, only slightly marred by a shower when the party was at Muckamore. On arrival at Antrim by the 10-15 train the road through the Massereene demesne was taken as far as the junction of the Sixmilewater with Lough Neagh, where a short time was spent botanising, the announcement being made that two prizes would be offered for competition, one for the discovery of the rare orchid, *Cephalanthera ensifolia*, and the other for the best collection of twenty plants gathered during the day. Much adverse comment was made on the unpleasant barbed fences on every hand, and the disagreeable texts to be seen relating to "trespassers," "dogs," and "poison." Surely a kindlier feeling might be expected from the occupier of this beautiful park. At the lake-shore some interesting plants were observed, though the season was not sufficiently advanced for many of the rarities known to grow here. The Vernal Whitlow-grass (*Draba verna*) and Lamb's Lettuce (*Valerianella olitoria*) grew on gravelly banks, and in the Sixmilewater flourished the rare *Ranunculus fluitans*, though not yet in

flower ; on a sandy bank near at hand the pretty *Cerastium arvense* was already in full bloom. Close by was seen the last resting-place of the unfortunate insurgents who fell at Antrim in 1798 ; whilst along the beach the fishermen's nets waved in the breeze, and Moore's beautiful words had a present meaning—

On Lough Neagh's bank, as the fisherman strays
When the clear cold eve's declining,
He sees the round towers of other days
In the wave beneath him shining.

With reluctance the pleasant scene was left behind, and the road taken for Boghead, which was a rich one for the botanists. On moist banks two uncommon sedges (*Carex strigosa* and *C. paniculata*) were obtained ; the latter were magnificent plants, some of them measuring six feet across. The hybrid Avens (*Geum intermedium*) was found, and in meadows abundance of the curious little Adder's-tongue Fern (*Ophioglossum vulgatum*).

W. S. Sloan, the genial resident, had a fine souterrain open and prepared for the inspection of the Club. After a careful examination by both ladies and gentlemen of this interesting subterranean dwelling of a long bye-gone age, not unattended with some excitement during the traversing on hands and knees of the narrow passage connecting the two chambers of the cave-dwelling, a pleasant relaxation in the shape of lunch was provided by Mr. Sloan. The Rev. W. S. Smith, of Antrim, then read a paper on the historical and antiquarian features of the district, that doubtless added much to the knowledge of those present, and tinged the different features of the landscape with a double interest, and wedded the story of the past to the beauty of the present. (This paper is given at the end of the present report.) After a few complimentary remarks from the President (Wm. Swanston, F.G.S.), Wm. Gray, M.R.I.A., moved, and G. B. Coulter seconded, a resolution giving the best thanks of the Club to Mr. Sloan for his hospitable entertainment. The photographers took views of the lunching group on the lawn prior to commencing the walk

along the river, where the many vistas gave ample scope for the labours of the most enthusiastic amongst them. The Sixmile-water was so named by the English soldiers passing from Carrickfergus to Antrim, because it was just six miles from Carrick, where their road crossed the burn. The original name was Ollar, which was changed to Owen-na-view, the river of the rushes. Some time was now spent amongst the pretty cottages by the river side under the branching trees, where lovely stretches of water charmed the eye. Here the hybrid Avens was found again, and also the Spindle-tree (*Euonymus europæus*) and a rare orchid (*Neottia Nidus-avis*) and on the road to Antrim the Dwarf Elder (*Sambucus Ebulus*) was observed in the hedgerow.

A halt was made at the old graveyard of Muckamore, the remains of the old monastic burial-ground, and the fragment of the abbey still remaining. The ancient name was Magcomair, "the plain of the confluence" of the Owen-na-view and Lough Neagh. The abbey was founded by St. Colman Eala, a contemporary of St. Columbcille, A.D. 585. Lionel Duke of Clarence and Earl of Ulster confirmed in 1363 the possessions of the prior and convent of the "B. Mariae de Mukmore in Ultonia." The present gardens of Muckamore House largely occupy the site of the ancient ecclesiastical buildings, but foundations of old buildings and roads have been traced where the adjoining mill now stands.

A short walk by the main road into Antrim brought the party to tea in Hall's hotel, when justice was done to the viands provided by the proprietor. After tea, a short business meeting was held, when eight new members were elected. On the motion of Wm. Gray, M.R.I.A., seconded by Alex. Tate, C.E., and supported by the President, a hearty vote of congratulation was passed to the Hon. Secretary, R. Ll. Praeger, M.R.I.A., on his appointment as assistant librarian to the National Library in Dublin, at the same time expressing the sorrow of the Club in their loss by his consequent resignation of the joint secretaryship. Mr. Praeger having suitably

acknowledged the compliment, no time was lost in making for the fine old church, under the guidance of the rector of the parish, the Rev. M. H. F. Collis.

The sculptured monuments of members of the Massereene family ornament the nave of the church, one being the work of the eminent sculptor Flaxman, whilst several painted windows enhance the general appearance of the sacred edifice. The silver communion plate was much admired, consisting of flagon, covered chalice, and paten, each inscribed "Ye Gift of Madam Abigail Parnell to Antrim Parish Church, 1701." The parish registers were also inspected, the careful way in which they are preserved reflecting credit upon those in charge of them. In the adjoining churchyard sleep many celebrated persons, amongst whom we may mention Owen O'Connolly, the informer of 1641; Sir John Clotworthy, keeper of the King's boats on Lough Neagh, and intimate friend of Oliver Cromwell; and George Victor du Noyer, the geologist. The surrounding walls of the yard were utilised by the Insurrectionists in 1798 with disastrous effect upon the King's troops, affording as they did ample cover for the occupiers, whilst they commanded the Main Street as far as the Market House. The church and yard were in the very thick of the fight, and the old door (still preserved in Antrim Castle) exhibits many traces of the struggle.

Before the train started there was still time for a hurried visit to the round tower, one of the most perfect cloic-teac in Ireland, in the vicinity of which was anciently a large religious settlement, all traces of which have now disappeared. The cameras were soon busy taking the tower from different positions, whilst many members obtained access to the interior by a ladder provided by the courteous landlord, George J. Clarke, J.P., who freely admitted the party to his grounds.

The 5-53 train brought the party back to the city, well satisfied with their visit to the historic town of Antrim, and the scenic beauty of the Vale of Moy-linne.

ANTRIM—ITS ANTIQUITIES AND HISTORY,

BY

REV. W. S. SMITH.

(Paper read at the Moy-linne.)

From an archæological point of view, the Round Tower is the most conspicuous object. It has braved the storms of perhaps a thousand years, and still survives with unbent shoulders and unbowed head, to speak in a silent language of other days and other scenes than those which now prevail. Long the subject of warm contention between interested disputants, the question seems now to have almost subsided under the conviction that these structures were of Christian origin.

There are several duns, or artificial mounds, in the locality—one at Crosscanan, in the direction of the hill Carneary, 73 feet in diameter and 12 feet in height; one at Dunsilly, near the residence of Thomas Ferguson; another adjacent to Antrim Castle, 153 feet across the base and 37 feet high; and another at Dunagore, which stands out prominently from a rocky projection, to a height of 44 feet. A most interesting one stood at Dunadry until about fifty years ago, when it was carted away, but fortunately, a pretty full record of its structure has been preserved. The basement consisted of three circular walls of loose stone, with stones in rubble fashion filled in between, and a stone grave in the centre, the whole being covered with rich soil. In this soil was a second grave, with portions of a skeleton, and near it a stone urn containing greasy ashes, with several personal ornaments by the side of it. The dun was 26 feet high, 32 feet across the top, where was a large hearth, and 151 feet in diameter.

There have been many raths—sites of fortified residences—in the neighbourhood, but I fear their number is gradually diminishing. The principal one is at Rathmore, two miles east of Antrim. It was for many centuries the residence of

the princes holding sway in the northern portion of the ancient kingdom of Dalaradia, those of the southern portion residing at Downpatrick. It appears not to have been occupied since the year 1315, when it was plundered and burned by Edward Bruce, brother of King Robert Bruce, who then invaded Ireland. Another important rath was at Rathbeg, near Rathmore, but it is partly destroyed. Here, in the sixth century, one of the kings of Ireland met his death at the hands of a Dalaradian prince. Between Rathmore and Antrim there is a rath, the only one in the neighbourhood, I believe, that had originally two circular earthen walls or ramparts, and two trenches. It is in a very dilapidated condition, and is about 50 yards in diameter.

There is a cromleac about a mile beyond Rathmore. The supporting stones have disappeared, and the great table-stone now forms a portion of a fence.

In addition to ancient remains above ground, we may, at several spots in the locality, enter structures of great antiquity existing below the surface. These are souterrains, built somewhat after the manner of lime-kilns, with walls approaching each other as they ascend, roofed with flagstones and covered with earth. They vary in size, and sometimes communicate with others by means of small, square passages. Much superstition attaches to them. I have seen an old man look remarkably serious at the mention of them. They occur at Craighall, Dunagore, Rathmore, (a series of three chambers was lately destroyed at Galley Hill, half-a-mile beyond the Steeple), Potterswalls, Lady Hill, Shanoguestown, and Tirgracey, where there is one consisting of two chambers, one above, but not running in the same direction as, the other. This is the only instance of the kind recorded in the north of Ireland. It was discovered accidentally in October, 1892.

Ancient stone and flint implements are occasionally found in the neighbourhood. I possess several celts, flint-flakes, rude spear-heads, arrow-heads, and a core from which flakes have been struck, that were met with in the locality.

The original town of Antrim stood near the Round Tower, where also was, at one time, a large monastic church. Not far from where the church stood, and in what is now the Steeple garden, lies a large knee-stone with two indentations, one deeper than the other. In the year 1147, we are told the town had a population of 600. There was doubtless a burying-ground near the Tower, as human remains are occasionally met with during gardening operations. When Ulster was settled by people from Scotland and England, old Antrim appears to have decayed, and a new town—Gall-Antrim, the Antrim of the foreigners—sprang up. These “foreigners” brought new thoughts, new customs, new modes of life with them. They built the Parish Church, which bears the date 1596, and, in the course of time, a Meeting House, which stood beside the road leading from the present town to the station, which gave way in 1700 to the lately renovated Old Meeting House, which is mother to that of Millrow, and grandmother to that of High Street. While the grandmother has become wayward and even heretical in its old age, the daughter and grand-daughter have remained in the peaceful lines of orthodoxy. A number of the followers of George Fox, that stern and staunch man of the leather breeches and the inward light, formed a congregation here in the seventeenth century; but it ceased to exist about forty years ago. The Moravians at one time had a few followers and a preaching-room in Antrim, but I have never come directly upon traces of either. The Rev. John Cennick, author of that fine hymn, sung at the present time in Antrim, and commencing—

Children of the Heavenly King,
As ye journey sweetly sing;
Sing your Maker's worthy praise,
Glorious in His works and ways—

used to come over from Ballinderry to conduct service here. This was about the year 1740 or 1741. Following three visits of the great apostle of methodism in the latter part of the last century, a Methodist congregation was established here. The

Roman Catholic congregation was revived in the early part of this century, and, as a consequence, though not immediate, the present commodious and substantial chapel was built about 25 years ago.

Antrim Castle dates from the early part of the seventeenth century, and was built by Sir Hugh Clotworthy. Sir Hugh was keeper of the king's boats on Lough Neagh, where, during the period of the civil wars and the great rebellion various naval engagements, on a small scale, took place. Antrim at that period was the scene of several encounters and conflagrations, in one of which the town was partially destroyed by fire. After a skirmish at the head of the town, the gate there was decorated in savage fashion with the heads of some of the slaughtered besiegers. Later in the same century, Antrim Castle was pillaged, and money and valuables to the amount of £5,000 taken. But Antrim figured much more largely in the political troubles that characterised the close of the last century, when the United Irishmen concentrated a portion of their forces here and attacked the town ; but, though favoured by momentary successes, they were eventually defeated with great slaughter, about 300 being killed. I used to know several who could speak from personal experience of the events of that time, but they have all passed away.

A friary once stood on the southern bank of the Six-mile Water, a little above the Castle. It was founded in the fifteenth century by one of the O'Neills. The remains of this building were met with in the early part of the present century. A much more important religious settlement, however, was the abbey at Muckamore, a mile-and-a-half from Antrim. It occupied a gentle slope at the upper entrance to the Vale of Moy-linne ; and not far away is the ancient burying-ground, still used for interments, in which the monks were laid to take their long, final rest. The abbey was founded in the sixth century by St. Colman, a nephew and disciple of St. Columcille. Little is known of the place during the lapse of many centuries. In 1183 the abbey was enriched by John De Courcey, and

additional gifts were made by several Norman knights. The churches at Doagh, Dunadry, Rathmore, and other places, belonged to this abbey. One of the priors compiled a register of the monastery, extracts from which are said to be still preserved in the British Museum. These shew that the abbey was possessed of nine townlands and fourteen churches, with their tithes, all of which were situated in the southern portion of the county Antrim. But the monastery at Muckamore, along with the others of the United Kingdom, fell under the despoiling hand of that unscrupulous monarch, Henry VIII. The last important record concerning the ancient abbey at Muckamore, only a small, ivy-clad remnant of which is still standing, relates to the year 1564, and it tells of the death of its last prior and all his monks. Several relics have been found in the immediate neighbourhood of the building.

Among matters of a miscellaneous character, it may be stated that permission to hold markets in Antrim was granted in 1605 ; to hold six fairs annually, and to return two members to Parliament, in 1665. In 1665, also, one thousand acres of land were granted to the Lord Massereene of that period for a deer-park. At the institution of the Legislative Union this privilege of returning members was purchased from the Massereene family for the sum of £15,000. For some time previous to the Union, Antrim gloried in having a mayor and corporation, who exercised proprietary rights over a specified portion of the coast of the county. These rights were appropriated by the Crown and compensation made.

Among ministers who have at different times been stationed here, the names of the most conspicuous are the following :—Revs. John Ridge, the first recorded rector of the parish, who settled here in 1619 ; Thomas Gowan, M.A., a very learned man, who died in 1683 ; William Adair, son of Rev. Patrick Adair ; John Abernethy, M.A., grandfather of Dr. Abernethy of medical fame, and author of several theological works of high repute in his day, who died in 1740 ; Dr. James Duchall, a voluminous writer ; and Dr. William Campbell. All these are

referred to in Reid's History of Presbyterianism, some of them pretty fully, while four, at least, have been honoured with a place in the great "Dictionary of National Biography." Other men of note who have been connected with the town, were—Owen O'Connolly, who revealed to the government the plot to surprise Dublin Castle in 1641. For many years he resided as an upper servant at Antrim Castle, and afterwards rose to be a major in the army. He was either killed or received his death wound in a battle with the royalist, Colonel Hamilton, at Dunadry, and was the next day buried in Antrim. Sir John Clotworthy (son of Sir Hugh), first Lord Massereene, was a very conspicuous man in the political and religious worlds of his time. It was he who seconded Pym's motion for the impeachment of Earl Strafford for his conduct in the government of Ireland, and which led to his execution on Tower Hill. Sir John—first Lord Massereene—died in Antrim in 1665. William Edmundson, an Englishman, a disciple of George Fox, resided in Antrim for a couple of years, distributed provisions and wares, and with them the principles of his master, and cultivated a faith that enabled him to travel many thousands of miles and to endure scorn, persecution, the stocks, imprisonment, and the prospect of a violent death without wavering. His "Journal" is well worth perusal. He died in 1713. The Rev. John Howe, M.A., one of the 2,000 clergymen ejected from English Church pulpits in 1662, was chaplain to the Massereene family for about four years, and often preached in Antrim church. Dr. William King, Bishop of Derry, and afterwards Archbishop of Dublin, and author of a very learned work on "The Origin of Evil," was born in Antrim in 1650. In the early part of this century Antrim could boast of a poet of its own native growth in W. A. Bryson, son of Rev. William Bryson, at that time minister of the Old Meeting House. A collection of his verses and translations was published, which indicated the possession of literary tastes, poetic ideals, and varied scholarship. He unfortunately committed suicide by drowning himself in the Six-mile Water.

Sir James Weir Hogg, Registrar of the Supreme Court of Calcutta, and a Director of the East India Company, and father to the late Lord Magheramorne, was born at Belmont, Antrim, in 1790. The only other worthy I shall mention is one who is, I am happy to say, still living, who nobly adorns the scientific world, and was born in High Street, Antrim, in the year 1829 ; I refer to Professor Hull, the eminent geologist. At the time of his birth, his father was curate of the church here.

As to the folk-lore of the neighbourhood, that is, I imagine, similar to what usually prevails in the north of Ireland. We still hear of marvellous and very significant dreams, the evil eye, ghosts, banshees, luck, bad and good ; omens, charms (there are many devotees to them) ; and I have much pleasure in informing you, that our little friends, the fairies, are still "to the fore."

I have only to add, by way of apology, in relation to this summary of matters, archæological and historical, pertaining to this district, that if there are any persons present who have read a little book of mine, entitled " Historical Gleanings in Antrim and Neighbourhood," they must kindly excuse me for having said so little that is new.

10th June.

PORTAFERRY AND QUINTIN.

The second excursion of the season was to Portaferry and Quintin, when the Club was favoured with delightful weather. Over forty members left by the 9.10 train for Downpatrick, where cars were waiting to drive the party to Strangford. The roads were in good condition, which rendered the run a pleasant one through this thriving district, the different features of the landscape being much admired. The ruined castle of Quoyle hard by the fast-flowing river ; the tiny lakes covered with the White Water-lily (*Nymphaea alba*) ; the marshes, filled

with Fleur-de-llys (*Iris Pseud-acorus*) ; and the sloping fields of corn or flax—each and all afforded pleasure and delight. By the road sides the sweet-smelling little Burnet Rose (*Rosa spinosissima*) was seen in abundance, whilst the Evening Catchfly (*Lychnis vespertina*) could have been gathered in armfuls. The following plants were also found during the day :—the Field Scabious (*Knautia arvensis*), the Water Speedwell (*Veronica Anagallis*), and the pretty white Water Ranunculus (*R. peltatus*). Many more were doubtless procurable if more time had been at the disposal of the members. Before entering Strangford, Lord de Ros met the party, and, with his usual courtesy, stated he would be glad if time would allow the Club to inspect his grounds, where many things of interest might be seen. No time was lost in getting on board the ferryboats at Strangford, the gauntlet of rival boatmen having first been run with the timely assistance of Mr. Russell, who here met the Club. Sails were hoisted, and oars plied across the “Strong Fiord,” as the Danes named this place on account of the strong currents that are so general. The Galls, or strangers, of Lough Cuan, or Strangford, are well known in our annals, there being at one time strong settlements of them here and at Olderfleet. The local guide and the secretary had the advantage of a small boat with a naturalist’s net, which was utilised in dredging up fine specimens of the large sea-urchin (*Echinus sphæra*), whose bright purple and pink colours made them centres of attraction amongst the dark algæ. These were afterwards distributed amongst the members. The fringed jelly-fish (*Acalephæ*) were observed assuming the most beautiful forms, and glistening with varied colours in the translucent water. It was deemed advisable not to spend any time in Portaferry examining the old castle and church of Templecranny, but to drive at once to Ballyquintin Point, where the geologists were anxious to spend some time amongst the glaciated rocks of the sea-shore. Passing the ruins of Ffoliott’s Castle on the right, the channel was seen opening out to the sea, the distance, however, being obscured by a heat haze

that hung about the hills and distant points. Upon reaching the extreme southern point of the Ards a large number made for the rocks under the guidance of William Gray, M.R.I.A., and the Rev. C. S. Greer and James Shanks, two local naturalists, who had here joined the party, while the others botanised and collected shells upon the sea-shore and otherwise engaged themselves for about an hour. The rocks here are well exposed, being at some places half a mile wide between the tides; the top surfaces are glaciated, and planed down nearly level, consisting of thick and thin beds of grits and slates. These beds are also penetrated by a large number of dykes, mostly felstones and minettes, some of which contain red felspar and flakes of black mica. Here also can be traced the terraces of the raised beach where worked flints can be procured in abundance. Some difficulty was found in coaxing the "readers of the rocks" from this happy hunting ground, and the secretary's whistle was sounded repeatedly without effect before an onward movement could be made past the drift hill crowned by the fine fort of Tara at a height of 180 feet above the sea, still bearing the Irish name, meaning the elevated place. Other fine forts on similar heights were seen, thus giving unmistakable proof of the ancient importance of this peninsula as a place of residence.

A short halt was made near the sea-shore at Tara to inspect a small stone circle there, which is doubtless the last resting-place of those who occupied the overlooking forts on the adjoining hills. Upon arriving at Quintin Castle, the meadow by the sea-shore was at once recognised by the numerous photographers present as a view not to be passed without some records. The flanking towers and heavy bastioned central keep, with the battlemented walls overhanging the sea, enhanced by the sloping sunbeams, afforded every opportunity for the "black art"; but the scene was doubly enhanced by the kindly courtesy of the Anketell family, who placed their grounds and castle at the service of the Club, whilst the ladies provided tea on the lawn for the thirsty visitors,

a refection that came so pleasantly unexpected. After the tower had been ascended and the different views admired, some photos of groups were taken around the tea-tables, when Alexander Tate, C.E., and William Gray, M.R.I.A., thanked the hosts on behalf of those present. The afternoon being advanced, there was not time to visit Cloughey Bay, as was expected, so the road was taken to Portaferry, past the ruins of Castleboy. A short sail across the incoming tide to Strangford and a speedy drive to Downpatrick soon brought the members to tea in Denvir's Hotel. A short meeting was held in the railway carriage under the presidency of Wm. Swanston, F.G.S., when the following new members were elected :—Robert May, John P. Dalton, and Robert Somerset, Belfast ; R. D. Darbishire, Solicitor, Manchester ; Rev. George S. Greer, M.A., rector of Portaferry ; and P. C. Cowan, C.E., County Surveyor, Downpatrick. All arrived safely in Belfast shortly after eight o'clock, well satisfied with a day spent in the Ards that proved both varied and instructive.

24th June.

BLACK HEAD.

A half-day excursion was made to Black Head, when the most enjoyable weather favoured a party of over sixty members and friends. The train was left at Whitehead, and a start at once made along the shore to the cliffs, a few members loitering here and there to obtain botanical and geological specimens ; no new records were, however, found by these collectors. The beauty of the scenery was much enhanced by the passing of the s.s. *Dynamic* close to the shore, subsequently followed by the s.s. *Adder*, whose speed and symmetry of outline elicited admiration from all present. The photographers took full advantage of the passing steamers to enliven their views of rocks and sea. Much interest was taken in the different caves in the basaltic cliffs, across the mouths of which the new path

is bridged, and many admiring and covetous glances were cast up at the extensive tufts of *Asplenium marinum* that grew out of the crevices of the overhanging cliffs, which, fortunately for that beautiful fern, were entirely out of reach of the most active of the party. The secretary's whistle called a halt at the largest of the caves, whilst the President, William Swanston, F.G.S., standing on a jutting rock, the waves dashing beneath, and the members dispersed around, explained simply the different geological aspects of the coast line, along which the Club was passing, and comparing the examples before him with the general geology of the earth's surface. Afterwards William Gray, M.R.I.A., in a few well-chosen words, complimented B. D. Wise, C.E., Engineer of the Northern Counties Railway, who was present, on the enterprise that had been shown by him in the useful and advantageous paths and seats that have been constructed around the head under his supervision. Too much credit could not be given to the railway company for thus opening up to the public one of the most beautiful and enjoyable walks in the North of Ireland, and that, too, within such a short distance of Belfast. The walk was then resumed along the rocky path, and through the long cave, in which an opening has been made at the far end, and the summit of the head was attained, when a glorious prospect opened out across the lough, now animated with sail and steam, and bright with sunshine. In a quiet dell at the base of the hill, under the shadow of a great elder tree in full flower, tea was partaken of heartily by all present.

Some members chose to depart by the early train, whilst the majority preferred to remain for a later one, and passed the time in different ways, some botanising, others sketching, or geologising, or hunting for entomological specimens. The old ivy-covered castle, erected by one of the Chichester family, was also an object of interest. The heavy excursion traffic on the line delayed the train, but Belfast was reached in reasonable time, bringing all home well pleased with Black Head and its charming scenery.

4th, 5th, and 6th July.

DUNDALK, NEWRY, AND CARLINGFORD.

The principal feature of the long excursion, which took place on above dates, was the alliance formed with the Dublin Naturalists' Field Club, and no member of either club will regret the union of pursuits that occupied the time, which turned out all too limited for the many interesting and instructive studies to hand in the districts of Dundalk, Newry, and Carlingford. A reserved carriage on the Great Northern ten o'clock train conveyed the party to Dundalk, where the Dublin members had arrived an hour previous. The waggonettes soon passed through the town, and on to Ballymascanlan, pausing on the road in sight of Castletown Fort, the famous residence of Cuchullin, chief of the Red Branch Knights, in the first century, and called Dundéalgan after a celebrated chief of the Firbolgs, Dealga, who flourished long previous to the Christian era. He it was who fought the chiefs of Conacht for seven long years in consequence of a great raid they made upon the plains of Muirthemne (Louth) and Cuailgne (Slieve Gullion). It is said that in his many battles not less than 50,000 men were slain, all of which is recorded in the Irish Tain-bo-Cuailgne. After a short drive up the side of the river, the cromleac and dolmen at Ballymascanlan were reached, and carefully examined and photographed. This cromleac is undoubtedly one of the finest in the country, a full-grown man with uplifted hands being able to walk under the top stone, which measures 12 feet long and 6 feet broad, and was estimated to weigh 40 or 50 tons. The dolmen, or giant's grave, which is close by, is about 20 feet long by 6 feet broad, with two covering stones remaining, the whole being in good preservation.

Whilst those interested in antiquarian matters were satisfying themselves at the cromleac, the entomologists were busy, and the botanists had already occupied themselves to advantage, as the following notes showed:—Near Dundalk—Greater Celandine (*Chelidonium majus*), Round-headed Poppy (*Papaver*

Rhæas), Evening Catch-fly (*Lychnis vespertina*), White Dead-nettle (*Lamium album*), a local Thistle (*Carduus crispus*), and a local Grass (*Festuca rigida*). The beetles taken at and near Dundalk included *Notiophilus biguttatus*, *Elaphrus cupreus*, *Phædon tumidulus*, *Erirrhinus acridulus*.

Killnasoggarth was the next stopping place, where the pagan standing-stone was carefully examined. It is situated in a marshy valley, with high hills on either hand, the summit of one being occupied by the frowning keep known as Moyra Castle, one of the outposts of the English pale guarding the pass north to the troublesome Ulster of the O'Neills and O'Donnells. This monolith was carved at a more recent, but still very early date, with a number of crosses and the following inscription in the Irish character and language :—
 “Ternoc mac Ciaran consecrated this place under the patronage of Peter the Apostle.”

The day was now far spent, and Slieve Gullion (1,893 feet) had yet to be surmounted, so no time was lost in driving to its base, when half of the party commenced the ascent, never pausing until the small tarn on the summit was reached, close by which are the remains of a hermit's cell. On the hill the following plants were obtained :—The Cow-berry (*Vaccinium Vitis-idaea*), Crow-berry (*Empetrum nigrum*), smaller Butterwort (*Pinguicula lusitanica*), and Mountain Cow-wheat (*Melampyrum pratense*, var. *montanum*). These did not in numbers come up to the expectation of the botanists. Among beetles, *Barynotus schonherri* was taken. Whilst the mountain was being climbed, the rest of the party drove round to the eastern base, stopping at the ancient church of Killeavy, where just at that time the simple flower-decked coffin of a peasant was being laid to rest, and each friend and neighbour rendering assistance in the mournful task.

“Yet e'en these bones from insult to protect
 Some frail memorial still erected nigh,
 With uncouth rhymes and shapeless sculpture deck'd,
 Implores the passing tribute of a sigh.”

This church must have been of importance at an early date, as it is of great size and strength, being divided in the centre into two parts by a thick gable, with a window, much earlier than the present east window. The heavy cyclopean door at the west end is of interest, and must have belonged to the primitive church of the sixth or seventh century.

All being reassembled, a drive by the road overhanging the wooded lake of Camlough soon brought the members to Bessbrook quarries, where the proprietor, T. H. M. Flynn (a member who had joined at Dundalk) had gone to a great deal of trouble in having a large blast ready for his visitors. The quarry, which is of an immense size and depth, was first examined ; then a hurried retreat was made to a safe distance, when the fuses were ignited. A few short moments elapsed, and then there was a noise like thunder, after which a quantity of granite, estimated at 150 tons, was seen to have fallen out in large blocks, some smaller pieces being blown to distances reaching 500 yards. After many thanks had been given to Mr. Flynn, who presented each member with a small polished block of granite, the waggonettes were driven to the Victoria Hotel, Newry, where all were soon made at home. After dinner E. J. M'Veeney, M.A., M.D., the President of the Dublin Field Club, was moved to the chair, when a deserving compliment was paid to R. Lloyd Praeger, M.R.I.A., late Joint Honorary Secretary, on his retirement from office in consequence of his appointment to the National Library of Ireland, in Dublin. This took the form of an album bound in full green morocco, with gold ornamentation, containing a suitable address beautifully illuminated, and over sixty views of North of Ireland scenery taken by members of the Club during their excursions, also many groups of the members. The album was suitably encased, the whole presentation reflecting credit on the makers, Marcus Ward & Co., Limited.

The Chairman, in rising to make the presentation, regretted the absence of the President of the senior Club, Wm. Swanston, F.G.S., who should have on this occasion filled the

place which he (Dr. M'Weeney) occupied. At the same time, he was much pleased to be able to take a part in the proceedings on this interesting occasion. He sympathised with the Belfast Club on the loss which they had sustained, and congratulated the Dublin Club on their corresponding gain. The Chairman's remarks were ably endorsed on behalf of the Belfast Club by Wm. Gray, M.R.I.A., past President. The address having been read by Francis Joseph Bigger, Hon. Secretary, the Chairman presented the album amid applause.

Mr. Praeger, in acknowledging the presentation, said he found it the more difficult to reply because he felt that such high compliments should be reserved for those who had rendered distinguished service to the Club, and he was aware how little he had done to merit the honour that had just been bestowed upon him; but he thanked the Club for their valuable gift, and more still for the kind words and friendly wishes that accompanied it. This album would ever recall the many pleasant days that they had spent together by field and valley and mountain, or in scientific intercourse and discussion. Although he could no longer be a regular attendant at their meetings and excursions, his interest in the welfare of the Club to which he owed so much would suffer no diminution, and he ventured to hope that his change of residence would add another link to the chain of friendliness and goodwill that already bound together the Field Clubs of Belfast and Dublin.

The corridors of the Victoria Hotel next morning early resounded with the secretary's whistle to prepare for an early start. At nine o'clock the waggonettes drove away through the High Street, past the graceful spire of St. Mary's, and the new granite tower on the Roman Catholic Church, which surpasses in gracefulness of outline any other tower in the North of Ireland, along the road by the side of the canal to Omeath, stopping here and there to allow the naturalists time to make different forays into the fields or down to the canal banks, and allowing the geologists to select samples of the red porphyritic granite in a quarry by

the roadside. Here was found the Enchanter's Nightshade (*Circæa alpina*), Zigzag Clover (*Trifolium medium*), and a St. John's-wort (*Hypericum dubium*). Arriving at St. Patrick's Bridge most of the party ascended Carlingford Mountain (1,935 feet), whose chief geological features were explained by Professor Cole, F.G.S. The summit being attained, the view of the lough and neighbouring mountains amply repaid the hill-climbers for their exertions, but time did not permit of delay, so the descent to Carlingford was soon accomplished, not before the botanists were well satisfied with the following finds:—Rose-root (*Sedum Rhodiola*), Beech-fern (*Polypodium Phegopteris*), and the Filmy Fern (*Hymenophyllum Wilsoni*). Of Fungi, three interesting Discomycetes were collected at base of Carlingford Mountain by Dr. M'Weeney — *Heterosphaeria patella* Tode, *Dermatea rhabarbarina* Bk., and *Lachnella bicolor* Rull. The first two of these have not been previously recorded from Ireland, and the third has been collected in Co. Dublin only. The beetles taken in the Carlingford neighbourhood included—*Serica brunnea*, *Otiorrhynchus maurus*, *Notiophilus biguttatus*, *Nebria gyllenhalli*, *Rhantus exoletus*. The residue of the party, who had driven to Carlingford, had time to examine and photograph the two smaller castles in the town, and the abbey of the Dominicans, built and dedicated to St. Malachi by Richard de Burgo, Earl of Ulster, A.D. 1305. The floor of the banqueting hall of King John's Castle afforded a splendid lunching-place, and here the tired hunters regaled themselves to a frugal repast, viewing at the same time from their exalted position the lough, studded here and there with craft, whilst Professor Cole took advantage of the situation to deliver a short lecture on the different geological features seen. He pointed out the principal features of the landscape, the hills being mostly formed from the weathered-out igneous cores of Tertiary age, with the far older mass of the Newry granite to the west. Across the lough, the granite of the Mourne has broken through Ordovician strata. Carlingford Mountain, however, represents an earlier phase of

activity, when gabbros and dolerites were erupted. Granite and eurite veins have subsequently penetrated this dark mass, the whole intrusive series being later than the Carboniferous period, and being assignable, with every probability, to early Tertiary times, on account of its close resemblance to the series in Mull and Skye. Looking seaward, the most recent geological feature of the district is observable—the interesting flat land on which Greenore stands. This is the raised beach that marks the last upheaval of the eastern coast of Ireland.

This castle was built by some of the followers of King John—A.D. 1210—to guard the lough before and the narrow pass behind, and was a place of considerable importance, its walls being in some places eleven feet high, many of its passages, chambers, and fortifications being still perfect. It was surprised and taken by Henry Oge O'Neill in 1596, and burned by Sir Phelim O'Neill in 1642; again it was taken by O'Brien, Lord Inchiquin, in 1649. About the castle and town were found two species of Swine's-cress (*Senebiera Coronopus* and *S. didyma*), Good King Henry (*Chenopodium Bonus-Henricus*), and Round-leaved Mallow (*Malva rotundifolia*), with an immense profusion of Red Valerian (*Centranthus ruber*).

After luncheon the party walked through the town to the station and took train for Greenore, where the geologists may be said to have truly enjoyed themselves at the raised beach of gravels, which is there so prominent along the shore, the lady members being especially active in uncovering marine shells. The coleopterists hunted assiduously, and amongst others found *Bembidium littorale*, *Cafius xantholoma*, *Hypera polygoni*, *Gastroidea polygoni*. The botanists found the Sea-holly (*Eryngium maritimum*), Horned Poppy (*Glaucium luteum*), Sea-orache (*Atriplex farinosa*), Hound's-tongue (*Cynoglossum officinale*), English Catch-fly (*Silene anglica*), White Mustard (*Sinapis alba*), and three poppies (*Papaver rhæas*, *P. dubium*, and *P. hybridum*). The best find of the day was made by R. L. Praeger on the railway banks, in the Lesser Toad flax (*Linaria minor*), where it was growing in abundance.

The party arrived at the Victoria Hotel, Newry, at seven o'clock, where, after dinner, the billiard-room was transformed into a lecture hall, with lantern ready and complete, thanks to the very courteous and able Dublin Honorary Secretary, J. Montgomery Browne. Dr. M'Weeney having resumed the chair, called upon D. M'Ardle, of Glasnevin Gardens and the Dublin Naturalists' Field Club, for his paper on "Mosses and Hepatics of the District," which was very instructive, and contained some flattering references to our Club botanists. This was followed by R. Lloyd Praeger on "Flowering Plants of the District," and then Professor Cole, of the Dublin Naturalists' Field Club, delivered a lecture that was to have been delivered by Professor Sollas, F.R.S., who was prevented from being present through an accident. This lecture treated of the great granitic and basaltic formations that had been visited by the Club, and was copiously illustrated with a fine series of lantern slides, microscopic and otherwise. A paper on the "Antiquities of the District" was then read by Francis Joseph Bigger, Honorary Secretary, which was followed by one on "Local Zoology" by H. Lyster Jameson, of the D.N.F.C. The Chairman then delivered his lecture on "Fungi of the District," illustrated by microscopic examples shown with his powerful instrument. Dr. M'Weeney explained how successful he had been during the excursion, having obtained as many specimens of a minute character as would give him many hours' work with his microscope to classify.

It was quite evident from the refreshed appearance of the members at the early hour of seven o'clock next morning that this pabulum of scientific lore had not interfered with their slumbers to any extent, as all were anxious to examine the nursery of T. Smith at Daisy Hill, Newry, before breakfast, and none there were who regretted the step, for such a fine display of rare plants is not to be met with on this side of the channel. Here a veritable rock-garden is to be seen filled with flowering shrubs and perennial flowers, including all the old ones, and many new, as well as aquatic and semi-aquatic plants. The presence of

this nursery was felt in the gardens that were subsequently visited at Narrow Water Castle and the Glen, and its effects must be wide reaching, and in time do away with the mechanical summer bedding that it is customary to see everywhere.

After breakfast the vehicles were taken up the old steep road to Ferryhill, the slopes of which gave ample time to naturalise by the wayside; the coleopterists took *Calathus melanocephalus*, *Serica brunea*, *Silpha rugosa*, *S. subrotundata*, *Pterostichus vulgaris*, *P. madidus*, *P. nigrita*, *Harpalus ruficornis*, *Coccinella xxv.-guttata*, *C. variabilis*, *Otiorrhynchus sulcatus*, *Thvmis lucida*, *T. atricilla*, *Coccidula rufa*, *Lachmæa suturalis*. A pause was made at the flagstaff to admire the view spread out beneath; the sea in the distance, with Rostrevor, nestling at the base of the mountain, Warrenpoint nearer, and the great woods of Narrow Water opposite, with the river winding between. Near this the vehicles were left, and the party descended through the woods, within whose depths were found the Hay-scented Fern (*Lastrea montana*), the Bree's Fern (*Lastrea æmula*), and the Tunbridge Filmy-fern (*Hymnophyllum tunbridgense*).

The ferry at Narrow Water, with the old castle behind, and the party in the boat at the causeway, was carefully photographed by one of the members, and will always afford an interesting reminiscence of the visit. Near this was found *Obione portulacoides* and the Sea-lavender (*Statice bahu-siensis*). Major Hall threw his grounds open to the Club, meeting them in his rock garden, which has been laid off with much botanical skill. An hour was appointed for meeting at the Newry gates, and till then all wandered about at their own free will; some photographed the fine trees, others botanised, finding the rare plant *Thrinicia hirta* on the lawn, whilst the coleopterists never seemed to weary; two adventurous spirits ascended to the very summit of the old castle that had been built by Hugh de Lacy in 1212 A.D., and destroyed by the Irish in 1641 A.D., to be rebuilt by the Duke of Ormonde. The object of their climb was not to find the ghost of de Lacy, but to take, if

possible, specimens of the bats that invest these old towers. None, unfortunately, were found, but a Barn Owl's nest was observed, out of which the young birds had just flown.

Punctually to the time appointed all were on the waggonettes, and Newry soon after reached, where an early dinner was partaken of, after which a short business meeting was held, and the following new members elected — Alexander M. Bain and George Gibson. No time was lost, so as to allow the members to accept the invitation of Henry Barcroft, J.P., to take tea at the Glen, where the ladies of the house, with true Irish hospitality, soon made one and all at home. The evening till train-time was spent strolling about the glen, and here the parting with the Dublin naturalists took place, not, however, before a full reunion had been arranged for at a later date. Their presence and society had been enjoyed by all, being a true union of hearts, and many hopes were expressed that these joint excursions should be annual, the Belfast people having derived additional profit and advantage from the arrangement, which it is trusted was reciprocal. Belfast was reached at nine o'clock, bringing all home well pleased with the most successful excursion, from a naturalist's point of view, ever held by the Club, and one that will always associate pleasing recollections with Dundalk, Newry, and Carlingford.

Among the rarer *Hemiptera* taken during the trip were—*Gerris costæ*, in small pool near top of Slieve Gullion; *Salda orthochila*, Slieve Gullion; *Fithanus Maerkeli*, Dundalk; *Calocoris roseomaculatus*, Carlingford; *Lygus lucorum*, Dundalk and Fathom; *Notonecta glauca*, in a lake at 1,800 feet on Slieve Gullion. Lepidoptera were very few in number, and of no special interest.

David M'Ardle, of Glasnevin Botanic Garden, collected mosses and hepatics, and reports that the best plants observed were as follow:—Mosses—*Campylopus setifolius* (Wils.), *Amblystegium serpens* (Dill), and *Sphagnum rubellum* (Wils.), on Carlingford Mountain; *Tortula jallax* (Hedwig), roadside

near Newry ; *Orthotrichum crispum* (Hedwig), wood at base of Slieve Gullion ; *Hypnum scorpioides* (Linn.), marsh at base of Slieve Gullion. Hepatics — *Frullania dilatata* (Linn.), Dumort, and *Cephalogia lamersiana* (Huben), wood at base of Slieve Gullion ; *Scapania umbrosa* (Schrader) Dumort, and *Plagiochila spinulosa* (Dicks) Dumort, on Slieve Gullion ; *Blasia pusilla* (Linn.), sparingly on damp ground near base of Slieve Gullion ; *Scapania nemorosa* (Dumort), var. *purpurea*, Narrow-water demense, and very fine on Carlingford Mountain ; *Nardia crenulata* (Dicks) Dumort, and *Jungermania turbinata* (Raddi), Narrow-water demense ; *Nardia hyalina* (Lyell), Carlingford Mountain ; Narrow-water demense, and Slieve Gullion ; *N. emarginata* (Ehrh.) B.Gr., *Riccardia multifida* (Linn.) Dill, Carlingford Mountain.

22nd July.

BALLYNAHINCH.

On arrival at Ballynahinch, the vehicles were mounted and a short drive made north of the town to the ancient graveyard of Killgoney, formerly the site of an earthen fort, where the remains of a cromleac were examined. The road was then taken round Ballymacarn lake, where a halt of about an hour was allowed at the church of Magherahamlet, whilst some natural history specimens were collected along the lake shore and some photos taken of the church. From this place the Spa was soon reached, where the time, until tea was ready, was spent at the sulphur spring and the curious labyrinthine gardens, a section going to the ancient church of Magheradroll, which was carefully photographed and other records made. At half-past four the party was entertained to tea in the Spa Hotel by Rev. Father Quail, of Dunmore, whose kindness and attention to the party throughout the day was a feature of general admiration and satisfaction. After tea, the demesne of

Montalto was entered, through the kindness of Captain Ker, when it was regretted more time could not be spent in botanising through the woods and around the lake covered with yellow and white water lilies (*Nuphar luteum* and *Nymphaea alba*) and abundance of Sweet Flag (*Acorus Calamus*). During the day an entomologist of the party took the following :—The Red Admiral Butterfly (*Vanessa Atalanta*) and the moths *Charæas graminis*, *Crambus tristellus*, *Argyresthesia mendica*, and *Dictyoteryx contaminana*.

26th August.

GIANT'S CAUSEWAY.

Beautiful weather favoured the Club in their excursion to the Giant's Causeway, not a shower marring the effect of cloud and sunshine during the day. About sixty members and friends left York Road by the 8.15 train in a carriage reserved by the courtesy of the manager, reaching Portrush in good time. The special electric car was waiting to speed on its way to the Causeway, and there was no desire to detain its progress, as it was felt that the longest day was not long enough to see the wonders of the Causeway and the headlands beyond. The golf links passed, the White Rocks were reached and the eyes filled with the stretch of sea and strand extending from the caverned cliffs to Portrush. The quick rush through the air and the steady vibrating hum of the cars told the electric current was doing good work and maintaining a rapid and continuous speed, leaving no question in the minds of the passengers as to the surpassing advantages of electricity, properly managed, over other means of locomotion. Considerable interest was excited as the ruins of Dunluce Castle came in sight, surrounded by the historical romance of past ages ; but the day was too young and the sun too high for the imagination to revel in the scenes witnessed around these historic walls in the earlier centuries. It took the crimson sunset and the lowering clouds of falling

night as seen on the home-coming to conjure up the departed spirits of the O'Cahans, MacQuillans, and MacDonnells, and the fierce fighting and persistent siege of Sir John Perrot, or the rather questionable means by which MacDonnell obtained possession of these lands.

At Bushmills the party was joined by a local member, W. A. Traill, electrical engineer of the tramway—an acquisition that was appreciated by all present, as the local information imparted by him throughout the day added greatly to the interest of the excursion.

On arrival at the Causeway Hotel, half an hour was allowed for lunch, and then a start was made down to the Causeway by all the members, it having been decided that none should go to the caves in the boats on account of the heavy sea that was running. Upon reaching what is called the Grand Causeway the secretary's whistle called all together, whilst Mr. Traill briefly described the different features of this wonderful geological formation, commencing at the Stookans and the rock resembling an aged female figure, and passing on to the Wishing Chair, then the Causeway upon which the party was standing, which he described as the overflowing of a thick sheet of lava subjected to a very gradual cooling by which the columnar formation is engendered. The columns, which are usually hexagonal, have formed at right angles to the planes of cooling, and as this has been virtually a horizontal sheet from which the covering beds have been swept away, the ends of the vertical columns constitute the causeway, which runs out into the sea a distance of 250 yards. Some of the pillars have three and four sides, others have five and seven. One column only, called the Keystone, is a perfect octagon. The party having been photographed by a member, the way was taken past the Giant's Loom towards the Giant's Organ, near which the shepherd's path was ascended to the summit of the cliffs. This stiff ascent having been surmounted, a halt was called and advantage taken of a small natural amphitheatre overlooking the varied landscape for the purpose of hearing Mr. Traill read

a short paper on local geology, a subject of which he is a very capable exponent, having been engaged on Her Majesty's geological survey. After referring generally to the basaltic formations and their undoubted volcanic origin (a proposition long disputed, many maintaining their origin was aqueous), he described graphically a recent visit to Vesuvius, and the seething lava that flowed down the sides of that mountain. Such was the action which went on here over an area extending from Moneymore to the Island of Mull, which was no doubt the most active of all the volcanoes of a district extending over an area of some 2,000 square miles, and leaving behind, after all the denudation which has since taken place, including that of the glacial period, a thickness of basalt of upwards of 1,000 feet as still existing in many places in this country. Amongst the lesser volcanic vents might be mentioned Slieve Mis, near Ballymena, where the last eruption has consolidated in the pipe through which it outflowed. Another small vent pipe was passed at Ailsa, about one and a half miles from Bushmills. Another is pointed out near Ballyrudder, Glenarm, which is a fine example of a volcanic vent ; there the basaltic pipe is seen penetrating through the Chalk formation, which has been very considerably altered by the heat of the igneous matter, and the usual compact white chalk has been converted into a crystalline white marble like loaf sugar, and the usual black flint nodules changed into a substance like white porcelain. As to the Causeway itself, it has been generally found that basalt when cooling has often one or two planes of cooling. If it be an out-poured sheet of basalt these will be the surface upon which it has outpoured, and its own top surface next the air, and in these cases the planes of cooling will be approximately horizontal. It has been found that basalt in thus cooling has a tendency to form into columns at right angles to their planes of cooling. These columns are entirely due to the action of shrinkage while in the act of cooling. Now the Causeway proper is simply a bed of basalt resting upon an ashy bed at the level of low water, and is about fifty feet in thickness ; and as

the planes of cooling are nearly horizontal, so the columns arising from the gradual shrinkage are vertical, and the great regularity and exactness of the columns may have arisen from the particular bed having been of very varied composition.

Never was professor more favoured with illustrations than Mr. Traill, for the different points of his paper lay in the landscape around and in the causeway spread out beneath. The walk was then resumed to Pleaskin, the different points of vantage being duly surmounted and the wild but enchanting views on either hand fully appreciated. Now a whin dyke was examined running out beyond the softer rock and making a sharp headland into the sea ; then the "chimney tops" were surveyed and Port-na-Spaniagh looked down into, where the rocks were wreathed with the foam of the heavy breakers. Here it was that the Gerona, a Spanish galleon, one of the Invincible Armada, commanded by Alonza da Leyva, and containing 300 of the sons of Castilian nobles, was wrecked. They were returning from the Rata, a magnificent ship that had been wrecked on the West Coast, and had safely passed Magilligan and Dunluce, but their unwieldy ship, which was principally impelled by oars, was unable to stem the mighty waves and was driven ashore, and

The cruel rocks they gored her side
Like the horns of an angry bull.

All on board met a watery grave. Some of the cannon were recovered and mounted on Dunluce Castle, and two of the iron chests which contained the gold and silver for the payment of the Armada are now in Glenarm Castle.

Each break in the headland is called a port, that at the Spetherd's Path is called Port-na-fhir (noffer), the port of the man—Fin MacCumhal. The next is Port Madadh Rhuadh, the foxes' port ; then comes Port-na-Spaniagh, where the Spanish galleon was lost ; next to that is Port-na-Calye, the old woman's harbour ; then Port-na-Brock, the badgers' port, just under the shadow of the mighty Plaisg-cinn, the goats' promontory, the highest of all these headlands (400 feet), and the one

from which the most extended views can be had. To the right towers Knocklayde; then Benmore, with its unmistakable outline, whilst a little off shore lies Raghery, with its clearly defined lines of black and white (basalt and chalk), like an old man-of-war. Nearer hand is Sheep Island, under the cliffs at Ballintoy, where the quaint church sits on the long level stretch of grain land, which forms such a peculiar feature of that district. Out to sea lie the bluff cliffs of Cantyre, and the smaller bulk of Islay, whilst the Paps of Jura are scarcely discernable in the distance. To the left stretches the much-indented coast line to Portrush, with the long stretches of sand at Bushfoot and the White Rocks, where the breakers leave long white lines of foam upon the yellow strand. Past Portrush, Derry hills fade into the blue mountains of Donegal, where the setting sun tinges with red the far-away island of Inistrahull. A pleasant walk soon brought all back with sharpened appetites to the Causeway Hotel, where justice was soon done to an excellent tea. After the repast W. H. Patterson, M.R.I.A., in a few remarks, conveyed the thanks of the Club to Mr. Traill for his attention during the day, and the assistance he had rendered in his paper and short descriptive sketch. He was supported by Alexander Tate, C.E., and Mann Harbison. Mr. Traill replied, stating it afforded him great pleasure to be of any service to the Club, of which he had long been a member, and only regretted his duties prevented him from joining more of the excursions during the summer season. The following new members were then elected :—J. Coleman, H.M.C.; R. T. Greer, John M'Neill, and Henry Scott.

After half an hour spent in the hotel grounds, a special tram-car was taken to Portrush, where the morning's railway carriage was resumed, and a quick run brought all back to Belfast, well satisfied with the weather, the scenery, the geology, and the hospitality enjoyed at the Giant's Causeway.

16th September.

LOUGHBRICLAND AND DONACHMORE.

Although the season was advanced, yet the usual Club weather favoured a large party, when the sixth excursion of the year took place to Scarva, Loughbricland, and Donachmore. At Scarva the party was met by a local member, the Rev. H. W. Lett, M.A., whose knowledge of the district was of much service throughout the day. The extensive demesne of J. Temple Reilly, J.P., was entered, where, through the kindness of the proprietor, an opportunity was afforded for investigating the very extensive ancient fortification known as the Dane's Cast, a characteristic portion of which extends across the lawn. It is recorded how the Norwegians, under Turgerius, in the reign of King Feidlin, in the ninth century, occupied this part of the country, which they intersected with deep trenches, and erected many castles—some singly, some doubly, and some triply entrenched. The rampart is traceable from Scarva to Killeevy. In some places it is shallow, and in other places it is faced with stone, measuring seventy or eighty feet across at its widest part. At Loughadian many years ago a variety of implements of war, such as celts, spear-heads, bronze swords, hatchets, and a large oak canoe, were dug up. This rampart was called by the Irish "Gleann-na-Muice-Duibhe"—the Glen of the Black Pig—whilst the great wall of Antoninus Pius in North Britain, to which it has a strong resemblance, is called "the Swine's Dyke." Perhaps the most admired thing about Scarvagh House is the well grown trees of oak and ash, but there is no finer sight in arboriculture than the huge Spanish chestnut growing close to the house, whose sweeping branches, loaded with fruit, cover a very considerable area of ground. There were also some fine specimens of walnut trees, well fruited, specimens of which and of the chestnut were, with the permission of Mr. Reilly, gathered by the members. Mr. Reilly showed some members the treasures of the house—the large branching antlers of the Irish elk, mingled

with the war-like trophies of a more recent age, flag and spear, drum and flintlock, the relics of King William and the later yeomanry, arranged amidst works of art, heraldic shields and military flags, forming quite a baronial effect in the quaint hall and corridors. After different views of the mansion-house and trees had been taken, together with some groups of the party, thanks were given to Mr. Reilly and family for their kindness and consideration. The machines were then mounted and the road taken through Loughbridland to Donachmore, only a momentary pause being made whilst Mr. Lett pointed out to the botanists the only station in County Down where the rare plant *Mercurialis perennis* is found. Here it was growing in abundance, but unfortunately its flowering was past. Upon reaching Donachmore, the rector of the parish, the Rev. J. D. Cowan, B.A., received the party, showing them the simple little church, tastefully decorated for harvest thanksgiving, and the fine old Celtic cross in the graveyard, whose recent restoration, to which the Club contributed, has been carried out in such a praiseworthy manner, affording an example that should be emulated in other places. This cross was probably erected to the memory of Saint MacErc, who was the first Bishop of Domnachmor, which church he founded in the middle of the fifth century. His mother was Bronagh, daughter of the chief Milcho, with whom St. Patrick had been a captive on the slopes of Slieve Mis, in the Braid Valley. The cross stands ten feet and a half high, and is of coarse County Down granite. The east and west faces are divided into panels, filled with scriptural illustrations, now much weathered. The base covers the entrance to a souterrain sixty feet long, several of which are in and around the churchyard, whose shape clearly points it out to have been a very early settlement, being probably a fort occupied in pagan times. Many events are recorded of this district, which was once covered with wood, cleared away in the reign of Irial the Prophet, A.M. 3529. At Achaderg was fought the battle of the three Collas, A.D. 332, which lasted for seven days, and the slaughter was so great that the earth was

covered with dead from Carneochy (Loughbricland) to Glen-righe (Newry). Irian, King of Ulster, perished in this battle, and the victorious brothers, known as the three Collas, descendants of Con of the Hundred Battles, afterwards marched on the Royal Palace of Emania, near Armagh, which they plundered and burnt to the ground. The rector had with some trouble got the entrance to one of the souterrains cleared out, and so enabled many of the members to investigate the primitive residence of the cave-men. The way was then retraced past Loughbricland, so called from a contemporary of King Connor MacNessa named Bricrind of the Poisoned Tongue, who by his bitterness of speech so inflamed the jealousy of the Royal women invited to a feast in his celebrated halls of Dundrum that all threw themselves upon the protection of their husbands, who were only too eager to uphold the honour of their houses, and then delivered "the battle speeches of the women of Ulster" so celebrated by the Celtic bards.

A pleasant drive through the undulating hills, along the winding lanes showed a plentiful harvest now safely gathered, and every appearance of comfort and prosperity in the snug homesteads and well-stocked yards. On the invitation of Captain Douglas, J.P., the party inspected the two very fine forts at Lisnagead, which are of great dimensions, each enclosed by two outer rings of earth and three deep fosses, all in splendid condition, and well worth going any distance to see, as doubtless they are two of the finest forts in close proximity to each other in Ulster. Captain Douglas also showed the members the horns of an Irish elk dug up in his demesne, and otherwise entertained the party, giving away specimens of the common Laurel covered with ripe fruit quite as large and as black as wild cherries, which is a rarity in this country.

A rapid drive soon brought all safely into the town of Banbridge, where justice was done to the good things provided in the Downshire Arms. After tea, the Vice-President, F. W. Lockwood, C.E., thanked those who had assisted the Club during the day, more especially J. Temple Reilly, J.P., and

Captain Douglas, also the Rev. H. W. Lett and the Rev. J. D. Cowan. A specially reserved carriage, reaching Belfast at 7.30, brought all home well pleased with their visit to an historic district not often visited, but well worthy of it.

WINTER SESSION.

SOCIAL MEETING.

THE thirty-first session of the Club was inaugurated on Wednesday evening, 1st November, by a social meeting in the Exhibition Hall, Botanic Gardens. Upwards of five hundred members and friends were present. Between seven and eight o'clock tea was partaken of, the teamakers being as follow :—Miss Andrew, Miss M. K. Andrews, Mrs. St. Clair Boyd, Mrs. Blair, Mrs. Carter, Miss Coulson, Miss Gray, Miss Hamilton, Mrs. Heron, Mrs. Ferguson, Mrs. Lockwood, Mrs. Leslie, Miss Clara Patterson, Miss Praeger, Miss Porter, Miss Phillips, Miss Rea, Mrs. Stelfox, Mrs. Proctor Smyth, Miss A. H. Tate, Miss S. M. Thompson, Mrs. Vinycomb, Mrs. Walker, and Mrs. Wright.

After tea, the chair was taken by the President, who welcomed all present, and referred to the leading features of the programme of exhibits. The principal exhibit, he explained, was a collection of Irish gold ornaments which had been brought together by Mr. Day, of Cork. In addition to the other exhibits, which they would find interesting and instructive, there would be a lantern display of living organisms, photos taken on Club excursions and other places. Prominent amongst the exhibits were the Irish gold ornaments referred to. Of these there was, as stated, a large and valuable collection, shown by Robert Day, J.P., M.R.I.A., high sheriff of Cork. There were decorated plaques, lunettes, fibulæ, ring money (Scandinavian and Celtic), neck ornaments, bracelets, and amulets, pins, brooches, &c. This was one of the finest and most valuable collection of antiquities ever shown in Belfast.

Mr. Day spared no efforts in order to afford the fullest possible information regarding the various articles exhibited. There were also shown the new albums in connection with the Club's archæological and geological survey of Ireland, containing about 400 platinotype photographs of Irish subjects. Also the Club's ordinary photographic albums, and some views illustrating the last season's Club excursions. The album, containing 80 local views by Club members, with illuminated address, presented at the long excursion to R. Lloyd Praeger, M.R.I.A., late honorary secretary, was on view. Also an album of local sketches by W. Lynch. A large number of examples of different skins, illustrating the uses and varieties of leather, were exhibited by John Vinycomb, M.R.I.A., ex-president; and a number of articles, including some examples of Celtic ornament, also the carved Irish cross belonging to the Rev. James O'Lavery, P.P., M.R.I.A., were exhibited by Robert May.

In geology there was a special exhibit, showing the various forms and uses of limestone, illustrated by a large collection of specimens contributed by members, including a number of photographs relating to the Carboniferous and Cretaceous rocks of the North of Ireland. Some specimens of Connemara marble, including green, black, shelly black, and grey fossil marbles, also four different granites, all from Galway, were shown by F. A. Porter. One table devoted to illustrations of limestone was in charge of Messrs. Gray and Lockwood, whose duty was to explain the nature, origin, and uses of limestone. For this purpose there was a display of specimens of limestone from every geological formation and from many countries. The attention paid Mr. Gray's demonstration upon the origin and qualities of limestone proved the interest taken in the subject of our native limestones. The illustrative specimens were contributed by William Gray, M.R.I.A.; Thomas Plunkett, M.R.I.A., Enniskillen; F. W. Lockwood, J. Robinson, R. May, &c. Joseph Wright, F.G.S., supplemented Mr. Gray's descriptions by microscopic demonstrations, showing the minuteness, beauty, and variety of the organic forms of which limestone is

mainly made up. William Gray, M.R.I.A., exhibited a very extensive series of flint implements, &c., illustrative of his paper on "Worked Flints, Ancient and Modern," and including some of the most ancient forms, such as are found in the river gravels of England and the Continent, and known as of the palæolithic period. Of the forms so abundant in the North of Ireland there were a great variety of all ages, which were compared with forms from America and various Continental stations. The modern gun flint manufacture was fully illustrated, and the use at present made of the County Antrim flints was explained.

In the entomological section there were shown Lepidoptera (butterflies and moths) collected in the Belfast district in 1893, with preserved larvæ of some of the species; also a small, but interesting, collection of Micro-lepidoptera and appliances for collecting and preserving these insects, by C. W. Watts, F.I.C. In Coleoptera there was exhibited the collection for prize 16. About fifty photographs illustrating the primitive habits and customs of the people of the North and West of Ireland were shown by Robert J. Welch; and Professor Haddon showed some sketches of the tattooing on the people of Torres Straits. Some fishes, beetles, and crustacea were shown by John Hamilton. In botany the collection of flowering plants for which prize 2 was awarded was shown by Miss Jeannie Rea; and a collection of choice British and exotic ferns were illustrated by dried specimens, fresh-cut fronds, and growing plants, shown by W. H. Phillips, F.R.H.S., member, and Charles M'Kimm, curator of the Royal Botanic Gardens. In the microscopical section a number of gentlemen attended with their microscopes, and illustrated various branches of science. Amongst the exhibits were living organisms, foraminifera, insects, animal and vegetable structure, and rock sections, with polariscope. Among the exhibitors were William Gray, M.R.I.A.; W. S. M'Kee, Joseph Wright, F.G.S.; H. M'Cleery, William Swanston, F.G.S.; William Hanna, M.A.; and J. O. Campbell, B.E., B.A. The collections of micro-slides, for which prizes 20 and 21 were awarded, were shown by Miss C. Patterson, member,

and Miss S. M. Thompson, member. Some views of children's games were exhibited by Miss Patterson, of Holywood. There was a very fine model of the paddle steamship *Slieve Donard* exhibited by James Pinion, during the evening, which was a most enjoyable one.

On the 20th November, 1893, the following papers were read :—"Irish Folk-Lore," by W. B. Yeats, of Dublin ; "A Few Children's Games," by Clara M. Patterson. W. H. Patterson, M.R.I.A., afterwards read the Report of the Ethnographical Committee.

W. B. Yeats, having been formally introduced by the President, proceeded with his lecture, which consisted in the main of illustrations showing the strong hold which a faith in the existence of a fairy kingdom still retains upon the Irish mind. They were surrounded, he said, by every kind of sorrowing lamentation, and they could never thoroughly express their emotions, no more than they could fully satisfy any of their desires. They desired the infinite, and the world was very finite. But Providence had sent them the fairy tales and the fairy kingdom to rescue their hearts and desires from starvation. One of the reasons why they never had enough of anything was because their poor bodies were tired out before their hearts and souls had their fill. But with the fairies their lives were a continual festival. Scotland had its folk-lore, but it excelled in terror. There were touches of horror in it which they could not find at all in Irish folk-lore. That incident in *Homer* where the cattle of the sun began to bellow up in spits might have been a piece of Scotch folk-lore. That was the quality of it. They did not get that sort of thing in Ireland. They got certainly a more beautiful, and perhaps a more admirable thing. They did not excel in terror. Speaking of the banshee, he comforted the audience by informing them that its cry was not always the forerunner of death, but always of some misfortune.

Having described a number of the inmates of the fairy kingdom, their appearance and peculiarities, the lecturer proceeded to say that the study of this subject had two great utilities—one old, the other new. One was a scientific utility. By comparing fairies and the folk-lore tales from all parts of the world they might learn much not only of the ways of primeval men and women, but also of their mythology and religion. They must not expect any great clearness of outline or uniformity in fairy belief. The other great utility of this study was very old : it had been going on since the days of Homer, nay longer still, since the days of the maker of the Mahabaratta. It was not scientific, but literary, and was really more important. He did not think there was a great poet in the world who had not borrowed from folk-lore. If they remembered that mythology was but folk-lore, organised and dignified, they would understand him when he said that Homer, Virgil, Sophocles, Shakspeare, Dante, Goethe, and poets like Keats, Shelley, and Rossetti, were little more than folk-lorists [with musical tongues. The story of Odysseus in the days of the cyclops was told in substance by the peasants of England, Ireland, and Lapland to this day. They could not measure how great was the influence that folk-lore—the gossip of the poor and the ignorant—exercised upon their thoughts and their feelings. He had often doubted if ever there had been any power in the world more mighty than these old tales. They had enabled the poets to give to the floating soul of philosophy a beautiful and alluring body. They could not tell who made them, but the storytellers who first fashioned them had been well nigh the most potent of the sons of men. With a few tales—for the root-tales of the lore were but few, a little over seventy for the whole of Europe—with a little bundle of romances, these men fashioned the minds of generations beyond reckoning. When he (Mr. Yeats) was a child he was told that there was a submerged city at the bottom of the Sligo lake, and that from its tower came up sometimes at evening a far-off murmur of fairy bells. Once when eight years old he gazed upon that lake, and he imagined, so much

did the story possess his mind, that he could hear the murmur of the bells creep up through its waters. The folk-tales lay hidden under their literature, as this city was thought to lie under the waters, and from them rose up a gentle and harmonious influence which filled all their poetry like a far-off murmur of fairy bells. (Applause.)

Wm. Gray, M.R.I.A., proposed a vote of thanks to Mr. Yeats, whom he complimented upon the very interesting lecture which he had delivered that evening.

R. M. Young, M.R.I.A., seconded the motion, which was supported by F. W. Lockwood, and passed by acclamation.

Mr. Yeats briefly acknowledged the compliment.

Clara M. Patterson said—Embryology teaches us that the development of the individual is an abbreviated recapitulation of the development of its species ; so it is also with a child. He repeats, as he grows, the savage stage out of which civilised man has emerged. If we compare children and savages—their habits, arts, &c.—we shall find they have much in common. Thus, for example, both the child and the savage are incapable of continuous mental effort ; no matter how interested they may be in what they are hearing, their attention is easily drawn away. Again, both have a great preference for physical instead of mental exertion. The school boy's treatment of girls (especially his sisters)—making them slave for him and yet looking down on them all the while—is an exact parallel of the way savages treat their women. The drawings of children are very like those of savages, and the idea of music which both entertain is the same—*e.g.*, as much noise as possible. The toys that are valued most by all children are the simple ones, such as the bow and arrow, which represent objects which *are* used, or have been used, by their parents. Children's games deserve special study, for in them are often found traces of savage customs, so that what was once done by our ancestors in earnest still exists in our children's games. There are marriage games and death games.

The game called "The Knights of Spain" is played through England, United States, Spain, Sweden, Italy, Ireland, among the Baltic Finns and the Moravian Sclavs. It is a marriage game based on the idea of a courtship conducted in the strictly mercantile spirit (F.L.J., II., 246). Thus in a version of this game from Bocking, Essex, it goes this way—

"I am a gentleman come from Spain,
I've come to court your daughter Jane."

"My daughter Jane is yet too young
To understand your flattering tongue."

"Let her be young, or let her be old,
She must be sold for Spanish gold," &c., &c.

Here are the words of this game as played at Ballymiscaw School, Co. Down—

"There was one lord that come from Spain,
He came to court my daughter Jane.
My daughter Jane she is too young
To be controlled by a flattering tongue.
Will you?"

"No."

"Will you?"

"Yes."

The one who answers "yes" then joins hands with the "one lord" and they dance round saying—

"You dirty wee scut you wouldn't come out
To help us with our dancing."

"There were two lords that come from Spain," &c., &c.

"Lords of Spain," Holywood, Co. Down—

"There were one lord came out of Spain,
Who came to court your daughter Jane."

"Your daughter Jane she is too young
To be controlled by flattering tongues."

"Oh fare thee well, oh fare thee well,
I'll go and court some other girl."

"Come back, come back, your coat is white,
And choose the fairest in your sight."

"The fairest one that I can see is ———, come unto me."

"There were two lords came out of Spain," &c., &c.

"Jeannie Jones," or "Jeannie Jo," is a very widely-known game, F.L.J., III. (2), 173. "Jo" seems to be the original name, and means sweetheart. At Ballymiscaw, Jeannie kneels with her head hidden in the "mother's" apron, and the rest walk too and fro. At the end Jeannie rushes after the others, and the one she catches is Jeannie next time.

"Jeannie Jo," Ballymiscaw School—

"Ladies and gentlemen come to see Jeannie Jo, Jeannie Jo. Is she at home?"

"Jeannie Jo 's washing clotnes; can't see her to-day."

"Ladies and gentlemen," &c.

"Jeannie Jo 's starching clothes," &c.

"Ladies and gentlemen," &c.

"Jeannie Jo 's ironing clothes," &c.

"Ladies and gentlemen," &c.

"Jeannie Jo let the hot iron fall on her foot; can't see her to-day."

"Ladies and gentlemen," &c.

"Jeannie Jo 's worse," &c.

"Ladies and gentlemen," &c.

"Jeannie Jo 's dead; can't see her to-day. What shall we dress her in—black?"

"Black for the black men; no."

"Blue?"

"Blue for the blue men; no."

"White?"

"White for the dead people; yes."

"Jeannie Jo," Holywood, Co. Down—

"I came to see Jeannie Jo, Jeannie Jo, Jeannie Jo, I came to see Jeannie Jo. Is she within?"

"Jeannie Jo washing clothes, washing clothes, washing clothes, Jeannie Jo washing clothes, and ye can't see her to-day."

"Oh but I'm sorry, I'm sorry, I'm sorry, oh but I'm sorry I can't see her to-day."

"Farewell, ladies, oh ladies, oh ladies, farewell ladies, and gentlemen too."

"I came to see Jeannie Jo," &c.

"Jeannie Jo starching clothes," &c.

"Oh but I'm sorry," &c.

"Farewell, ladies, oh," &c.

"I came to see Jeannie Jo," &c.

"Jeannie Jo smoothing clothes," &c.

"Oh but I'm sorry," &c.

"Farewell, ladies, oh," &c.

"I came to see Jeannie Jo," &c.

"Jeannie Jo dead, dead, dead," &c.

"Oh but I'm sorry," &c.

"Farewell, ladies, oh," &c.

"What shall we dress her in, dress her in, dress her in, what shall we dress her in—shall it be black?"

"Black for the sweeps, the sweeps, the sweeps, and that shall not do"

"What shall we dress her in, &c. Shall it be blue?"

"Blue for the sailors," &c.

"What shall we dress her in, &c. Shall it be red?"

"Red for the soldiers," &c.

"What shall we dress her in, &c. Shall it be orange?"

"Orange for the orange men," &c.

"What shall we dress her in, &c. Shall it be white?"

"White for the corpse, &c., and that will just do."

They then make a funeral procession, the two biggest making a seat with their hands for "Jeannie" and carrying her, followed by the rest in pairs, saying—

"We have lost a soldier, soldier, soldier, we have lost a soldier and the queen has lost a man. We will bury him in the bed of glory, glory, glory, we will bury him in the bed of glory, and we'll never see him any more."

"Jeannie" sits up on the mother's knee, and is not hidden as in most of the versions. Repetition is a marked feature of primitive rhyme.

GREEN GRAVEL.

Ring of children, who walk round singing the rhyme over and over, and at the end of it each time the child named turns round and walks backwards, so that at the last all are going backwards. These are the words as played at Ballymiscaw School—

"Green gravel, green gravel, as green as grass grows,
When all the free masons around the red rose.
Dear (Bessie), dear (Bessie), your true lover's dead,
He sent you a letter to turn round your head."

Another version, played in Dublin and about Newry, is as follows :—

"Green gravel, green gravel, the grass is so green.
The prettiest damsel that ever was seen,
I washed her with new milk and dressed her in silk,
And I wrote down her name with a brass pen and ink.
Dear —, dear —, your true love is dead,
And I send you a letter to turn round your head."

The following game, known as "Round about the Punch Bowl," at Ballymiscaw, is very widely known. One child is in the centre of a circle of children, who dance round singing—

"Round about the punch bowl, once, twice, three.
The last time they catch in time they'll not catch me.
(Lizzie) made a pudding so nice and so sweet,
Saying—taste, love ; taste, love, don't say nay,
For next Sunday morning to church we will go.
Rings on her fingers and bells on her toes,
With her baby on her knee, and through the world she goes,
Up the heathery mountain and down the rushy glen.
We darna go a-hunting for Corner and his men."

The Dublin and Newry version is not just the same as this, and is called "Up the Heathery Mountain," but both are played the same way. The making of the pudding is important, for in savage weddings the bride making some dish that the bridegroom partakes of is a very important part of the marriage.

"Up the heathery mountain and down the rushy glen,
We daren't go a-hunting for Corner and his men.
We are all sally butchers, but one game cock,
And that's (Willie Douglas), the flower of the flock.
He's the flower of the flock, he's the keeper of the glen,
He courted (Aggie Wilson) before he was a man.
He hugged her, he juggled her, he took her on his knee,
Saying my dear (Aggie) won't you marry me.
(Aggie) made a pudding so nice and so sweet,
And (Willie) got his knife and cut it round and neat,
Saying, taste, love ; taste, love, don't say nay,
For next Monday morning is our wedding day.
He hips and he clips, and he buys her a ring,
A cherry for a church, and a gay gold ring."

W. H. Patterson, M.R.I.A., then presented the following Report of the Ethnographical Committee:—The Committee appointed by the Club, met in the Museum on October 30th, 1893, and had the advantage of Professor Haddon's presence. Professor Haddon commenced by explaining the reason for the

delay in sending instructions to the Committee. The British Association Committee of the Ethnographical Survey of the British Islands, was appointed in 1892, and they reported to the Association at Nottingham in August last. The report had been accepted, and now the British Association Committee was about to begin work.

Our Ulster Committee was elected in January, 1893, and, as a result, four papers had been read before the Belfast Naturalists' Field Club, and published in the Proceedings (Series 2, vol. iii., part 6). F. J. Bigger, Secretary to the Club, read a paper on Local Folk Lore (pp. 545-548); Lily S. Mollan communicated on "Pishogues from Tipperary" (pp. 571-573); W. H. Patterson, Secretary to the Committee, gave an account of "Irish Fairies" (pp. 573-583), and Mrs. Blair's paper was entitled "Items of Folk Lore: principally from County Down" (pp. 583-586).

The Field Club had always taken an interest in archæology, and a valuable illustrated summary of local flint implements has been presented by Wm. Gray, entitled, "Worked Flints, Ancient and Modern" (pp. 548-569, plates 1-8). Clara M. Patterson has taken down, and made photographs of, several children's games, a branch of folk-lore which is of extreme interest. Lastly, the series of photographs, made by R. Welch for the purpose of illustrating Irish peasant life, and the survival of the past in the present, are of very great value in the Survey which is now being started. The above is a very fair record for nine months work, when we bear in mind that nothing has as yet been accomplished in England in connection with the Survey.

Professor Haddon further pointed out the direction which future work might profitably take, and invited members of the Club, during their summer holidays, to make observations on the hair and eye colour of the folk in country districts. The observations should be made according to the methods first employed by Dr. Beddoe, and now adopted by the Survey Committee. He also asked for volunteers to undertake the

collection of physical measurements and the measuring of skulls. Amateur photographers could also help by photographing local forms of houses, vehicles, implements, and the like, and especially by collecting portraits—full face, and accurate side face, of types of the people, and he requested that copies of such photographs should be sent to him at the Royal College of Science, Dublin.

The Committee would also refer to Professor Haddon's paper on the Arran Islands and their inhabitants, read on the 17th of January last. Some printed instructions as to collecting of folk-lore matters have been sent to the Committee for the assistance of members of the Club.

The following new members were elected :—John Carson, Mrs. Purdon, J. M. Cleaver, B.A. ; T. Ward, E. Hamilton, F. J. Kennedy, Thomas Lawrie, Mrs. Pender, Mrs. Mathewson, and J. G. Grogan.

On 20th December, 1893, the President occupied the chair, and opened the proceedings by a few remarks on the advantage to be derived from the study of geology. He touched upon the practical advantages to architects, builders, and others, and also upon the broader educational benefits that the study of this most interesting science afforded to all the lovers of nature, pointing out from his own personal experience the great pleasure he had derived from the study of the rocks of the counties of Down and Antrim, recording many instances of the almost enthralling interest the collections of different specimens afforded him from time to time. The President then called upon Wm. Gray, M.R.I.A., to deliver his lecture upon "What is a Stone," which he proceeded to do in his usual forcible and convincing style.

After Mr. Gray had given a few humorous answers to the question, "What is a Stone?" received by him from different quarters, he proceeded to his lecture proper, keeping his audience fully interested for over an hour. The lecturer traced

the history of the earth's surface and the formation of rocks and the different ages, with the geological sub-divisions, illustrating his remarks by large diagrams and an enormous collection of rock specimens ; in fact, it is doubtful if a finer collection was ever brought together in the Museum. Throughout his lecture he was frequently applauded, and at the termination Mr. Gray invited all present to come up to the large table and carefully examine the varied samples used by him in illustration of his lecture. The President, F. W. Lockwood, C.E. ; John Hamilton, and S. F. Milligan, M.R.I.A., made some remarks and asked a few questions. The following members were then elected :—Rev. Charles Coade, M.A., LL.D. ; James Coghlan, T. W. Foster, M.A. ; P. Murray, Samuel Blythe, and Rev. James Maconaghie, B.A. (Cliftonville Avenue).

A meeting was held on the 16th January, the President in the chair, when three communications were brought before the meeting.

John M. Dickson read the following paper on "Relative Antiquity of Rath, Cromleac and Burial Tumulus : as evidenced by some Ancient Remains near Dromore, Co. Down."

Mr. Dickson said—Ireland is the home of enigmas ; there has always been an Irish question. The land, indeed, bristles with questions, and nowhere more thickly than in the field of archaeology. To the solution of these questions, Irish antiquarians have devoted much patient labour ; and while we must admire the enthusiasm, the industry, and perseverance they have displayed in their investigations, we must also regret sometimes that the only good quality they seemed to lack, was that cardinal virtue of all enquirers, to wit, scepticism.

When we consider how difficult it often is, even with our facilities for collecting and circulating intelligence, to learn the exact truth about matters occurring, say a mile off last week, we can better estimate the value of the legendary traditions of a distant and superstitious age.

Gifted more fully with the amiable credulity of Mr. Pickwick than with the cautious induction of a Lyell or a Darwin, some of our antiquarians seem to have taken too seriously the traditions that form so large a part of the old monkish chronicles, which, however valuable as ecclesiastical histories in early Christian times, contain much that can only mislead.

These ancient records, the "Book of Ballymote," and the "Annals of the Four Masters," which date from the 14th century, and the "Book of Leinster," 250 years earlier, were compiled from older writings, fragments of which are still in existence. These again were largely made up from the oral traditions of the bards and Seannachies, who were in the habit of holding a convention once every three years at a central point in Co. Meath, in order to repeat these traditions to the younger men, from generation to generation. We could hardly suppose that these men were always deficient in the national genius for embellishment, or that they were protected during all that time by a chronic miracle, from the temptation to indulge it.

For instance, when the reader meets with the statement that on such-and-such a date, *anno mundi*, "the lough of Belfast broke out!"* he would like to learn some further particulars about this extraordinary *outbreak*. What were the symptoms accompanying the eruption? Was it, so to speak, cutaneous in its nature? and confined to the crust merely? Or had the earth been suffering at this point from some deep-seated hydrocele, unknown to the geological faculty.

Thus legends have multiplied, till they cling like ivy to every crumbling wall of castle or of abbey, some of them perhaps containing a "poor half-penny worth of truth," but always mixed with "an intolerable deal" of the wildest absurdity. To these we need not turn when we seek to learn something about the origin of those ancient structures around us, which we know by the various names of forts, raths, or duns, to

* Annals of Four Masters, a.m. 3506. "Lough Leagh in Ulster," explained by commentators as Belfast Lough.

discover who were the builders of them, and for what purpose they were erected. Here tradition fails us, beyond the general statement that they belong to the "good people," and that it is unlucky to interfere with them in any way. Let us approach the subject then with becoming caution, for here, surely, if anywhere, we are in fairyland.

We frequently hear these raths incorrectly spoken of as Danish forts. This is a complete misnomer; the Danes had nothing to do with them. Digging earth-works was not one of their methods. They infested the coasts of Ireland during the ninth and tenth centuries as amphibious pirates, making many raids inland to rob the monasteries; and though they obtained for a time strongholds on land, as at Dublin, Waterford, Limerick, and Cork, they never scattered themselves over the country as an occupying population. King Brian Boru (or Brian of the tribute) ultimately forced them to confine themselves to these ports, and to pay him tribute for permission to trade there. They thus seem to have become the first importers of foreign produce in Ireland, as we learn, they were required to pay their tribute in wine. For instance, the Danes of Dublin had to pay annually 500 pipes of wine, those of Limerick 300 pipes of red wine, and other ports in proportion, all to be delivered at Kincora in good order and condition. These quantities of wine may seem to us, in these degenerate days, a right royal allowance for the palace, but when we remember the large number of clergy maintained by the King, all no doubt grateful to King Brian for having delivered them from their Danish persecutors, and willing on all suitable occasions to drink his majesty's health, there probably was not a drop too much!

We find these raths giving their names to a large number of townlands and other localities in Ireland, such as Rathcormac, Rathmullan, Rathfriland, &c. Even more frequently the form *lis* is used, as Lisbellaw, Lismore, Lisnagade, &c. Occasionally we find the word *lis* ending such names as in Kenlis, the old name of Kells, in Co. Meath. Kenlis means the head fort or

chief residence. The noble family of Taylour, who have their residence there, deriving two of their titles from this word, viz., Earl of Kenlis and Marquis of Headfort ; while we find at Dromore, the townland on which the great mount stands called Ballymaganlis, evidently a corruption of Bally-na-cen-lis, the town or place of the head fort.

On this subject Dr. Joyce states that the word rath or ra occurs in the names of upwards of 1100 townlands, while the form lis begins 1400 of such names. This is not to be wondered at when we remember the great abundance of these raths in Ireland. As many as 2191 are marked on the six inch ordnance maps of Co. Limerick alone, while the province of Munster contains 10,000. We must not assume, however, that the raths themselves date from the time when these places received their names, but being then prominent landmarks they served to distinguish the various localities, just in the same way that the physical features, such as the shape of a hill or valley, river or ford suggested the great majority of such names.

Some years ago, when in the West of Ireland, I entered one of those subterranean crypts, or *souterrains*, found in these raths. It was the first of such that I had seen, but my guide (who had assisted Sir W. Wilde in his excavations in that district) informed me that of some thirty-five raths opened by them, a souterrain was found in every one that was surrounded by a deep trench or moat, and Mr. Brash, who had a large experience in the pursuit of ogam inscriptions in the South of Ireland, confirms this statement. He says—"As a rule, every rath has a souterrain." My curiosity being thus aroused on the subject, I was led to observe these raths more closely, to become impressed by their appearance of great antiquity, and to arrive at the opinion that in these we have the remains of the most ancient structures intended for habitation in Western Europe.

You are all, no doubt, familiar with the traditions of the various invasions of Ireland in remote ages by the Nemedians,

the Firbolgs, the Tuath-de-Danaans, and lastly by the Milesians, who are said to have arrived as much as 1700 years before the birth of Christ. Now, the amount of belief to be placed in all or any of these traditions is very much a matter of individual discretion. The widest difference of opinion has already been expressed by various writers, who claim to speak with authority. At one extremity we find Sir W. Wilde, who accepts these traditions literally, although they were not recorded in writing within 1000 or 2000 years after the events, and vouches for all the details of the battle of Moytura, as fought on "the 11th day of June, 3303 A.M.!" the various single combats, the number of combatants engaged, &c. ; where the Firbolgs were finally defeated by the Tuath-de-Danaans, and most wonderful of all! he finds confirmation of all this in the great sepulchral mounds still to be seen in that neighbourhood, and said to have been erected over the bodies of the chiefs of the defeated Firbolgs. As if the remnant of the beaten race would have been given time to erect above a score of enormous earth-works on the field after such a total defeat. Assuming, however, as true, that a decisive battle was fought here between a resident race and a more powerful invading army, the presence of these mounds may point to a very different explanation, the key to which is to be found in the remains at Stonehenge and Avebury, where we see many sepulchral mounds, or barrows in the immediate vicinity of great works, probably intended for temples. May such a temple not have once stood at this spot, round which in the course of centuries these tumuli had been raised. If so, where would a retreating race be so likely to make their final stand as on the ground sacred alike to their religion and to the graves of their kindred?

At the other extreme, we have Mr. Rhys in his Hibbert lectures, who evaporates the whole mass of these traditions about invasions of Ireland into solar myth; in which, for instance, at the battle of Moytura the Firbolgs figure as mists and fogs retiring before the sun on midsummer day. This view is just as unsatisfying as the other extreme, as it altogether

ignores the historical certainty of invasions and displacements by stronger and better armed races, which have taken place in hundreds of instances all over the world, and which are amply confirmed in Ireland by the remains of the different races to be found and the local distribution of their descendants at the present day.

The most scientific view of the matter is that taken by Boyd Dawkins, in his work on "Early Man in Britain," who traces the various waves of population pressing westward over Europe; from their remains in prehistoric times; and later, from the accounts given by Strabo, Caesar, and others, the stronger still encroaching on the weaker. First, the cave-dweller, who was, as depicted by himself, a naked savage, the contemporary of the mammoth in these countries, who hunted the urus and the elk for his subsistence, and contended with the cave bear and the hyæna for his rock shelter. Then the Iberian, swarthy and small of stature, and not of Aryan stock, who used Neolithic weapons, kept domestic animals, and in many ways seems to have been the pioneer of civilisation. One, perhaps both, of these ancient races (if indeed they were not one race) had found their way to Britain before it became separated from the continent. Being afterwards isolated, for probably an immense time, from the struggle for existence, they would fall an easy prey to the advance guard of the stronger and better armed Aryan Celt, when he had advanced so far as to navigate the channel, on those periodic swarming times of that enterprising race. Unable to retain possession of the fertile river valleys, the weaker race was forced to retreat to the forest-covered hills and morasses, and to make a precarious existence off the poorer soil that offered no inducement to its conquerors.

These raths or lisses, which were used as dwellings, are easily distinguishable from the great burial tumuli, such as those composing the Brugh na Boinne, or "city of the dead," in Co. Meath, those near Cong, and elsewhere in Ireland, which are usually either conical or rounded in their elevation, and are not surrounded by a trench; while the rath proper

always suggests a fortification, and is encircled by one or more moats. While one class of structure was evidently raised to the honour of the dead, the other as clearly was meant for the protection of the living. The absence of the moat round an earthen enclosure also enables us to distinguish the keels, or pagan cemeteries, from the raths, while a circular enclosure with a moat of trifling depth was probably only intended for penning cattle. On this point, Major Wood Martin, whose work on crannoges gives some weight to his opinion, divides raths into three classes, and as he classes first "those for penning flocks and herds at night, to protect them from wolves and marauders," we may assume he considered this class the most numerous, and this is an extremely probable view. The inhabitants of Ireland at that time, although depending partly on hunting and fishing, seem to have been mainly pastoral, and as most of the country was covered by forests and morasses, the natural meadows were widely scattered, so that herds of cattle were frequently obliged to remain at night at considerable distances from the residence of their owners, under the charge of a herd with a wolf dog or two, so that many such places of safety would have been required.

Major Wood further states, in the same work, "Prehistoric Sligo"—"The raths must have been erected principally by the Tuath-de-Danaans and the Milesians." As he uses these names from the "Annals of the Four Masters," he most likely accepts their chronology as well, which would give to some raths an antiquity of 3000 to 4000 years. These Annals mention the erection of two raths in the reign of Neimidh, 2350 years before Christ, and several during the reign of the early Milesian kings, 1700 years before our era. But as they also mention the first appearance of some of the chief rivers and lakes of Ireland in the same reigns, which we know to be impossible, their evidence is too much vitiated to be relied on. When we consult other authorities on Irish antiquities, we are surprised to find that although they treat exhaustively of burial tumuli and crannoges, or artificial islands, they scarcely refer to raths

proper at all. The reason of this, no doubt, is because of the rarity of those objects interesting to collectors to be found in connection with them.

Mr. Wakeman in his book on "Irish Antiquities," when speaking of the souterrains found in raths, says (page 136)—"These chambers were partly used as places of temporary retreat, or as storehouses for perishable commodities, the want of ventilation rendering them unfit for the continual habitation of man," and Mr. Brash, in his exhaustive work on ogam inscriptions, in which he devotes a chapter to raths, says—"The rath is assigned to pagan times in our legendary and historical relations, and the traditions of the peasantry have sanctified them by a thousand weird tales. They are said to be the abode of the 'good people.' They dread to pass them after nightfall lest they should disturb their occupants at their occult orgies. And the existence of such numbers of them in the country is entirely owing to the peasantry, whose superstitious fears prevent them from aiding or assisting in their destruction." Again—"That the rath, lis, or caher, as these constructions are variously called, are the oldest works in the country, there can be no doubt. The hardest oak decays, stone will yield to the influence of wet and frost, the strongest built walls will succumb when the mortar that unites them loses its cohering quality; but the earth mound that encircles the rath will last as long as the clouds and the summer sun that fertilise its grassy slope."

Both these statements show close observation, and commend themselves by their probability; but when we find Sir W. Wilde, in accounting for the great numbers of these raths, saying—"Certain districts in Kerry presented a greater amount of population than at present exists in any rural part of Ireland of the same extent." He seems to assume that all the raths now to be seen were occupied simultaneously, which is most unlikely—so many causes would lead to their abandonment from time to time. For instance, their occupants being driven away in the numerous raids so common in those lawless times,

and forced to settle elsewhere, or from the necessity of a larger and more elaborate dwelling during a time of prosperity, or when a more favourable site was discovered. We must not suppose that these works were an exception to the universal law of development. An immense time passed during their occupation, and no doubt many of the smaller and more rudimentary of them became obsolete and were abandoned for more improved forms, so that a long succession of disused dwellings of widely different dates, on account of their indestructible nature, and the superstition of later times when agriculture commenced, are now preserved together.

To illustrate this idea, let us suppose for a moment that some other human *exuviae* were as immortal as earthen mounds. Let us take cast-off boots for example. Suppose that all the boots worn by the late Dan O'Connell during his life were still in existence, ranged together on the field of Tara, and pointed out to Macaulay's New Zealander, on his arrival there, as evidence of the number of feet possessed by that extraordinary man. What a splendid theme for the local guide! Wouldn't he treat the stranger to a symmetrical legend; perhaps something like this—

"In ould ancient times, your honor, there was a great giant lived in these parts by the name of the Big Beggarman; he was a great giant entirely, for he had a foot on him for every day in the year. And it's him was well off, too, for he had a boot to fit every foot he had, and that was a quare thing in them times, for there was plenty of cratures then that hadn't a boot to their foot at all, at all. And sure enough, your honor, isn't there his boots to this day."

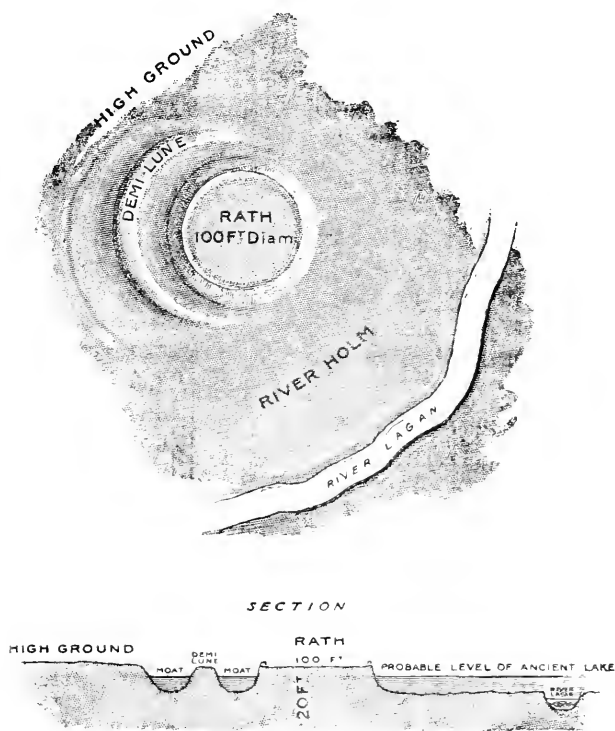
Of the antiquity of these raths we have sufficient evidence, but chiefly of a negative character; for instance, we never find mortar used in the construction of the souterrains. Nor had their builders any knowledge of the arch, and no weapons or other articles of metal have been found in them. Then the great accumulations of bones that surround the crannoges, amounting to many tons sometimes, are entirely absent. Why

are no such accumulations found in connection with raths? They also were the dwellings of a flesh-consuming race for many centuries, for no such permanent structures would have been erected for temporary use. And why can no fragments be found of the wooden houses that formed the shelter of their inhabitants? The conclusion is forced upon us, that the date of their occupation was so extremely remote, that metals that might have resisted decay were unknown, while bones and all other organic refuse have long since returned to their elements.

As some information on this obscure subject may be found in certain ancient remains near Dromore, Co. Down, a description of them may possibly have a little interest for the Belfast Naturalists' Field Club; the more so as ethnology has recently been added to its programme. These earthen mounds of various kinds, so widely scattered over Europe and America, are often the only land-marks of forgotten races remaining for the study of ethnologists; capable, perhaps, of one day becoming the very alphabet of their science, they are still too often little more than hieroglyphics, the key to which has been lost.

The rath to which I wish to direct your attention is not the great "Mount" of Dromore, but one locally known as "Phil's Fort," lying about a mile west of the town, close to the road leading to Lurgan, and within thirty yards of the River Lagan. While not so large as the great "Mount," it is still of respectable dimensions, being 100 feet in diameter on the top, and standing 18 to 20 feet above the bottom of its moat. The peculiar circumstance about this rath which I wish you to notice, is that its double moat is only carried half round. The parapet, or demilune, that divides the two moats tapers to a point at each end, its upper surface still coinciding, apparently, with that of the natural promontory, of which the builders of the rath availed themselves; while the other half of the rath, that abuts on a level meadow or holm, is quite unprotected by any outwork whatever. It is evident that this parapet or demilune is still complete as left by its builders. Had any portion of it been removed, (by a change in the course of the

river, for instance) we should find its ends escarped, and not as they now are, tapering to a point on each side. Why were these elaborate defences which we find on the other side not carried all round?



Ground plan of rath near Dromore, and section of same restored.

In order that you may better understand the weight of this question, I must make a geological digression into the antecedents of such river holms, for the benefit of such of you as have not the familiarity with the habits of rivers that is to be picked up in thirty year's practise of trout fishing. The

present course of most of our rivers represents only the thread upon which at one time a long chaplet of glittering lakes was strung. Each lake finding its outlet at the point where its confining bank was lowest, and by its own action during many centuries cutting back a passage through this barrier until it drained itself, leaving exposed a nearly level plain of alluvium—its former bottom—soon to become covered by vegetation, across which the river now cuts its winding course ; while on some of these holms we can still see, at the point of influx, a portion of the old delta deposited in the lake, showing the height at which its surface remained. Such was the undoubted history of the river holm on which this rath abuts.

Now, why did the builders of it, who laboriously cut two protecting trenches on the other side, leave this side totally unprotected ? The inference is obvious. This side was then sufficiently protected by the deep water of that ancient lake. The rath, then, is older than the holm, how many centuries older no one now can tell. But how old is the holm ? Let us look around ; if we cannot tell just how old the holm is, we have proof that even it is older than another “unknown quantity,” for on its surface still lie the remains of at least one burial tumulus, carrying us back to pre-christian times ; and we may fairly assume that hundreds of years had passed over this grassy level before that ancient monument was raised upon it, for no one would have chosen it for such a purpose while even a tradition remained of its having been covered by water.

The local report about this tumulus, which rests upon the authority of the late Mr. Walsh, the antiquarian of Dromore, is that the stones used in building a portion of the wall round Gilhall demesne were taken out of it. This is probably the truth, for we can see that considerable excavations have been made on two sides of it. Enough still remains, however, to show that it was perfectly circular, with a shallow depression all round. Though composed of stones of moderate size, bound together with earth, it has been so compactly built that during

all the centuries it has stood there, not a stone has been displaced by the feet of cattle on those portions of the original slope still remaining. A rough measurement shows that it contained at least 200 tons of material, mostly stone ; and yet this great mass rests above two feet of fine alluvial soil, in which no stone is to be found as large as a marble. As the central portion of this mound is still undisturbed, where the cinerary urn might be looked for, the means are at hand to verify the view I have taken of its object, viz., that here we have a burial tumulus of pagan times. But this is not all. Within twenty yards of this tumulus, and also on this fine alluvium, lie three great fragments of a rock (not native to the district), averaging more than a ton a-piece, and each bearing on it the mark of the "villanous saltpetre" that rent the parent block, while right between these fragments we find an oblong depression of the surface, suggesting that other large stones had been extracted. Now, although this great stone was probably found on some of the hills round, which are composed of boulder clay, no natural process could have brought it to where we see its fragments now. Only human agency can account for its position ; in fact, every appearance points to its having been at one time the cap-stone of a cromleach. Here, then, upon this holm stood a pagan burial tumulus, and most probably a cromleach too. Both must be of more recent date than the surface on which they were erected.

We have then three points of antiquity to consider. The most ancient, the rath and lake ; next, the holm ; and latest, the pagan tumulus and cromleach. How old are they ? Now, as no pagan interments have taken place in Ireland for about a thousand years, the tumulus and cromleach (the most modern of these remains) must be of that age at least, but may be twice that. How much older is the holm ? and how much older still the lake in whose margin this rath was built ? We cannot, however, hope to do more than establish the relative dates of these ancient remains, and this, I believe, is done by the peculiar form of this rath, in being defended by the usual moats

only half round. I have never seen or heard of another instance like it elsewhere, and unless explained in the way I have endeavoured to do, its shape would be meaningless.

One other chronological point about these raths is established beyond the shadow of a doubt, and this is, that ancient as they are, some of them at least are not nearly so ancient as the ogam inscriptions, as these have been found in many cases on the long slabs of stone used in covering the crypts or souterrains, and in such positions that the inscriptions could neither have been engraved nor deciphered where they were placed, showing that these sepulchral monuments had ceased to be respected by the rath builders, which implies an immense lapse of time among a race so unwilling to disturb the memorials of the dead as the Celtic—a period of such immense duration that this archaic cipher may have lost its significance and been replaced by a newer alphabet.

We have, then, three classes of ancient remains in this country. Can we fix their relative antiquity? The oldest of the three, the ogam inscriptions, were doubtless the work of the aboriginal Iberian. That the burial tumuli were erected by the earliest tribe of Celtic stock that invaded this country after it had become an island, we may fairly assume, as they seem to have introduced the practice of cremation, which was associated with those monuments. What shall we say about the raths? While we find barrows, or burial tumuli, in many Celtic countries, this particular form of earth-work seems confined to Ireland. Did the idea arise here? May we assume that the first rath builder copied, in his artificial cave, the natural one of the savage cave-dweller, and added to it his symmetrical superstructure? As the Iberian was in other ways a pioneer in the march of civilisation, we may owe to him also this most ancient form of human dwelling.

Perhaps a fuller examination of these most interesting remains than they have yet received may enable us to reply to these questions, and throw some light into those dim abysses of the past, when these islands were still connected with the

continent, and before the waves of the Atlantic had gnawed away those ranges of basalt and limestone that once connected our northern shores with Scotland. When the primeval nomad of Europe, moving ever westward from the cradle of the race, impelled by his instinct to follow the declining sun, found his further progress stopped in this Ultima Thule of the West, where, then as now, the edge of winter was dulled by the soft influences of the Gulf Stream, and where no intolerable summers scorched up its perennial streams—the land thus described by Ferguson :—

“There is honey in the trees where her misty vales expand,
And her forest paths in summer are by falling waters fanned ;
There is dew at high noon-tide there, and springs in the yellow sands
On the fair hills of holy Ireland.”

In this land of unfading verdure he may have been tempted to cease from his wanderings ; here, first perhaps, to raise by the labour of his hands a fixed abode for those dependent on him, that first momentous step in the long struggle with the powers of nature that was destined to transform the savage; and, as the simple primordial cell which, biologists tell us, was the earliest dawn of organism, held within it, by the law of its being, all future developments of life ; so in some of these rude earthen dwellings around us we may perhaps still behold the very germ of our Western civilisation, the germ that involved, not alone the loftiest palace of the present day, but also all those refinements and sanctities that have clustered round the thought of home !

NOTE.—Since reading the foregoing paper my attention has been called to an appendix to O’Laverty’s “Diocese of Down and Connor,” vol. 4, which is a list given by one Thos. Fagan of antiquities found and “forts” demolished by the farmers, in several parishes, in the Counties of Down, Antrim, and Armagh, during the early part of the present century. A careful analysis of this list (which includes, under the general title “forts,” earthworks of all descriptions) will yield little or nothing to

affect my general statements regarding the great antiquity of the true rath or lis. In about half of the cases recorded, the "forts" demolished were evidently sepulchral, as urns containing human bones were found ; and in the great majority of the others nothing more than some rude stone implements are mentioned. Of the five or six remaining, we may safely class most as crannoges ; for instance, one at Inisloughlin described as "almost inaccessible as it was situated in a bog." Here round metal balls were found (a common crannoge form), both name and situation prove it to have been a crannoge. In the same category I would place the "fort" mentioned at Knockmore, where "oak planks dressed by an edged tool were found five feet under the surface," from the depth mentioned we may safely assume the "surface" to have been bog. With regard to the forge dross found in demolishing forts in Ballycarrickmaddy, may this not have been simply calcined clay, which might be looked for about the fire-hearths mentioned ? Here, again, we have no description of the two "forts" given by which to class them ; and, further, as no iron weapon has yet turned up that can be connected with a rath, we may safely dismiss this "forge dross" also. There remains, in fact, just one case that seriously deserves notice, that of the fort at Ardmore, in the parish of Killead, which, from its description, was evidently a true rath ; and here were found, "in the ditch, quantities of bones of deer and small-sized cows, broken earthenware, a bronze pin, and pieces of mortised wood." This solitary instance forms just such a complete exception that it rather tends to prove the opposite rule ; for here, and here only, we have no less than four classes of remains, usually absent, found all together "in the ditch" of this one rath. All probability points to a second settlement here in much later times, either on the rath itself or so near it as to make the moat a convenient dumping place for refuse.

The plates have been kindly supplied by J. Vinycomb, Esq.

Francis Joseph Bigger, M.R.I.A., honorary secretary, then read the following paper on "Pre-historic and Historic Forts and Rathes in the City and Vicinity of Belfast."

The rapid extension of our city on all hands, whereby the old country marks are being blotted out, caused me to occupy a few spare evenings last summer in surveying and measuring the primitive dwelling places of the people who lived in our town and neighbourhood in early times. These people walked what are now our streets, hunted our plains, fished our rivers, climbed our mountains, and, doubtless, eked out as comfortable and satisfactory an existence in those primitive days as we do now; they were the free denizens of a district rich in woods and affording excellent hunting grounds for a pastoral people. Now all is changed, and where once was the narrow path amid the crowded wood, the causeway through the marsh or across the river and the undulating plain, there arises the tall mills, the smoky chimneys, and the long rows of houses.

For a few minutes to-night let us forget these every day aspects of our district and view in fancy, strengthened by the facts I am about to lay before you, that past and those people whose day and life can only be accurately contemplated by a careful study of the remains still preserved to us through a long succession of troublous epochs.

O'Curry tells us these remains belong to the most remote antiquity. The rath was a simple circular wall or enclosure of raised earth enclosing a space of more or less extent in which stood the residence of the Chief, and sometimes the dwellings of one or more of the officers or chief men of the tribe or court. Sometimes also the rath consisted of two or three concentric walls or circumvallations; but it does not appear that the erection so called was ever intended to be surrounded with water. The dun was of the same form as the rath, but consisted of at least two concentric circular mounds or walls with a deep trench full of water. These were often encircled by a third or even greater number of rings at increasing distances, but this circumstance made no alteration in the form or in the signification of the name. Dun is defined in Celtic law as two walls

with water. This definition would apply to any mearing formed of a wet trench between two raised banks of earth. The dun and rath had sometimes small chambers excavated under the ground within the enclosing rampart. These chambers vary in size, but are usually nine or ten feet long, three or four feet broad, and three or four feet high ; the entrance is very narrow, and similar narrow passages connect the chambers with each other. The chambers correspond with the earth-house of the Norse, and were intended as places for hiding valuables and, perhaps, as places of refuge. The fort is the conical mound whose highest point is its centre. You hear these remains commonly called Danes' forts ; now, this is misleading, for the Danes never built the earthworks that are scattered so broadcast over our country, the time of their occupation was not sufficient for such a purpose, and, besides, they only occupied the fringes of Ireland and did not gain any permanent access to the interior. The expression, however, may be a corruption of the name of a primitive race that did build such dwellings, namely, the Tuatha-de-Danaans, who occupied the land previous to the introduction of Christianity, and whose name may have become corrupted. The "Four Masters" record the building of raths from the year *anno mundi* 3500 till *anno domini* 1100, and their occupation till even more recent times. It has been suggested that our round towers took their form from the shape of the more primitive rath, for primitive ideas were not prone to radical changes. The great fort of Rathmore, near Antrim, has a written history from the second century, being the Rath Mor Muighe-Line of the historians. In the seventh century it was the residence of the Princes of Dalaradia, by whom it was occupied in 1315, when it was burned and looted by Edward Bruce, brother of King Robert. It is now "tilled by a Saxon churl," which was prophesied of it long before its destruction. It is easy to conceive how these erections were places of considerable strength before the introduction of fire-arms. The different circumvallations were skilfully planted with sharpened stakes crossed and plaited together with wattles, the same as at

present constructed in savage lands ; the more rings that surrounded the stronghold rendered it the more difficult of capture by the enemy, as each redoubt had to be taken separately. Small twisted passages were left through the stakes, and these could be closed at a moment's notice. The houses in which the families lived were in the centre, and were built of stakes, wattled and covered with mud and thatched with sods or grass. The interior was fitted up according to the taste or inclination of the owner—the walls and floors being covered with skins and other trophies of the chase. In similar raths to those in our vicinity have been found the remains of red and fallow deer, oxen, horses, swine, and fowl, with cooking places made in the earth filled with charcoal, burnt stones and calcined bones ; clinkers have also been dug up, showing that iron was worked, of which fragments have also been found. Numerous querns, hones, and sling stones have been got ; also, bone pins, piercers, beads, combs, and knife handles.

None of the forts in our immediate vicinity are of any great size, of course always excepting MacArt's Fort, which is the pride and glory of our landscape. It would be almost sacrilege to measure it, as nothing but "time's effacing finger" shall ever destroy its outline, and assuredly we shall not live to see that. This fort is mostly natural, but partly artificial, and was doubtless occupied by a MacArt O'Neill, after whom it is called ; but its first occupation is lost in the mists of time. The contour of the hill from certain points resembles a human face, and in the revolutionary times of '98 was likened to the head of Freedom crowned with the cap of Liberty. One of our members, a youthful poetess of no mean excellence, has recently sung of this self same hill—

The face was shaped and hewn, these rocks were blent
In earliest ages of creation's morn,
When by the earthquake's shock the globe was rent,
And from the fire and flood the hills were born ;
When ocean swept over cape and continent,
And all lands were of sentient life forlorn,
And no man witnessed from our island coast
The marching of the glacier's spectral host.

I saw her sit upon her mountain throne,
 Girdled with many a sunset reddened bar
 That bound her shining garments as a zone ;
 Her voice came sobbing as the sea afar,
 Her vaporous locks into the zenith blown
 Had dimmed the brightness of the evening star.
 A robe of cloudy texture, golden hem,
 Clad her, and moonlike was her diadem.

Her head is lowly pillowed on the breast
 Of this our motherland, and to the skies
 She lifteth from that everlasting rest
 The unwavering worship of her stedfast eyes ;
 Wiser than Freedom's daughter of the West,
 Who all the storms of air and sea defies,
 Flaming her beacon torch to all men's sight—
 Our God-given image looks to God for light.

And light is granted, through the summer day
 The shadows and the golden sunshafts sweep.
 The rainbow arches o'er her, storm clouds stay
 Upon their march and flashing lightnings leap,
 Showing how 'neath the curtaining cloud of grey
 She lieth undisturbed as if in sleep,
 'Till through the falling fringes of the rain
 The sunburst shineth, and she smiles again.

The fort lying nearest the centre of our city that I can find any record of is one that formerly stood in the middle of Carlisle Street, where Jane Street intersects, close to Carlisle Circus. No. 50 Carlisle Street stands upon its centre. It was oval in shape, measuring about 140 feet from N.E. to S.W., and 110 feet transversely. In the "Ulster Journal of Archaeology" there is a note to the effect that a rath stood close to the Antrim Road, near the new burying-ground, and adjacent to St. Malachi's College. In 1834 it was intact, and in 1857 it had been effaced by a brickfield. I believe it is the same as the one in Carlisle Street. The same fate immediately awaits two other raths at the corner of the Ballygomartin and Shankill Roads, which I will hereafter describe, for when I visited them last summer with R. Lloyd Praeger, the owner was making

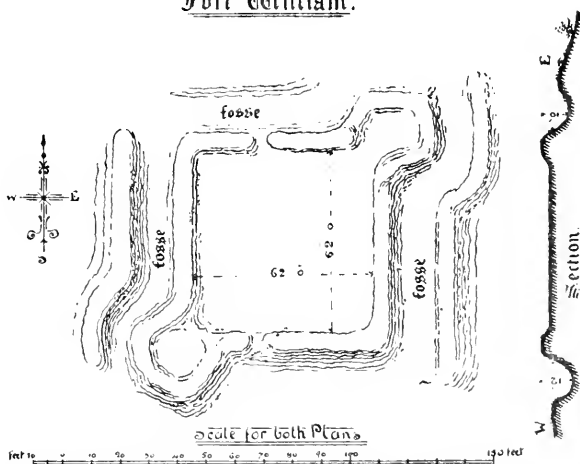
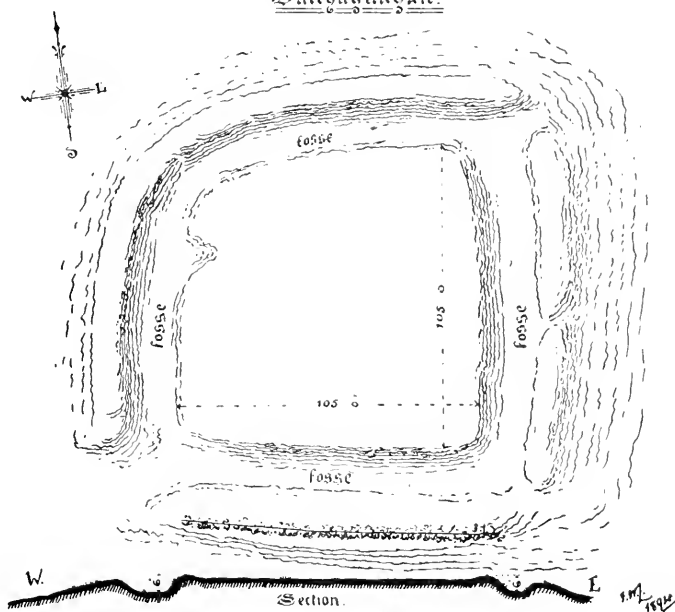
bricks and building new houses within a few yards of both of them.

There was probably a fort at Duncairn, near where the residence of the Macrory's stood ; but of this I have no positive information, although many people believed the small circular mound known as the ice house, that stood revealed when the trees and shrubbery were cut away, to have been the remains of an ancient residence.

The next rath is at Fortwilliam, close to the residence of George S. Clark, J.P. A very small portion now remains, planted with large sallagh trees. Under this rath is a souterrain, into which many people have told me they have entered. It stands upon a drum or knoll of gently rising ground, its situation being a rather commanding one, overlooking the sloping ground to the sea, including the now obscured promontory called Ringan's Point, at the bottom of Fortwilliam Park. The elevated situation of the rath at Fortwilliam marked it out in Elizabethan times as the spot for a fortification for the English soldiery, for a few paces to the north of the ancient dwelling there still exists in almost its original condition a very fine earth-work, square in shape, with two corner bastions surrounded by a fosse, varying from ten to twelve feet deep, with an outer rampart of earth four to six feet high (see plate). The centre square measures sixty-two feet on the four sides, and is surrounded by a low bank three feet high ; but the most remarkable features are the two circular bastions at the diagonal corners, viz., the N.E. and S.W., both perfect, and corresponding in the surrounding rampart and fosse to the body of the fort. The N.E. one measures in diameter ten feet, and the other is a little larger, measuring fifteen feet. The extreme diameter of the whole works is about a hundred and twenty feet. R. M. Young, M.R.I.A., in his valuable "Town Book," states—"The square earthen redoubt known as Fortwilliam was almost certainly non-existent in Essex's time, and corresponds in plan with another fort having similar small bastions at the four angles to receive cannon, situated

immediately under the Cave Hill. There seems a strong probability that these works were thrown up to form a defence on the north side of the town against any sudden attack of the Scotch in 1640." Now, may not this fortification and the one at the base of the Cave Hill (which I shall describe shortly) have been erected by the gallant but unfortunate Earl of Essex during his brief sojourn in Ulster.

In 1573, in the halycon days of "good Queen Bess," the Earl of Essex was encamped at Crag-Fergus, claiming a grant of half the country of the Clan of Yellow Hugh O'Neill, otherwise Clandeboye, in right of a bequest from Edmund Mortimer, Earl of March, to his niece, which had fallen into the hands of the crown. Sir Bryan MacPhelim O'Neill, whose ancestors had here held undisputed sway for fourteen generations, had beaten back the English within the walls of their town of Carrick. The Earl boasted that he would be successful, should it cost him his earldom. It cost him more, for he lost his head. The Irish did not seem to be in rebellion against the Queen, but naturally resented the usurpation of their lands by an Englishman. It took the cunning and cruelty of Sir Arthur Chichester, the succeeding adventurer, to drive the natives into open rebellion and then gain his chief end, the confiscation of their lands. A proposition having been made to reduce the number of the Queen's soldiers under Essex, the Earl writes from Carrick that such would be disastrous to his objects, as he had been more successful of late. In this letter he said—"I think it not the way to save the Queen's charges, for I see noe cause why every countye in Ireland should not mayntein the Queen a nombre of soldiours. Theise Irish lords, which make their countreys to mayntein twentye thousand soldiours to warre against the Queen when they list, sholde be made to pay English soldiours to serve Her Majestie, and their idle kernes hold to their work or to the gallows." All of which was very kind of the noble Earl. Then follows "a noate of the severall seates for placing of the gentlemen adventurers for their princypall dwellyngs, reserved for Her

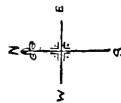
Fort O'Neill.Ballyaghagan.

FORTS AT EDENDERRY.

Horizontal Scale
0 15 30 45 60 75 90 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 420 435 450 465 480 495 510 525 540 555 570 585 600 615 630 645 660 675 690 705 720 735 750 765 780 795 810 825 840 855 870 885 900 915 930 945 960 975 990 1000 feet.

Vertical Scale
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 130 135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 325 330 335 340 345 350 355 360 365 370 375 380 385 390 395 400 405 410 415 420 425 430 435 440 445 450 455 460 465 470 475 480 485 490 495 500 505 510 515 520 525 530 535 540 545 550 555 560 565 570 575 580 585 590 595 600 605 610 615 620 625 630 635 640 645 650 655 660 665 670 675 680 685 690 695 700 705 710 715 720 725 730 735 740 745 750 755 760 765 770 775 780 785 790 795 800 805 810 815 820 825 830 835 840 845 850 855 860 865 870 875 880 885 890 895 900 905 910 915 920 925 930 935 940 945 950 955 960 965 970 975 980 985 990 1000 feet.

N^o 1.

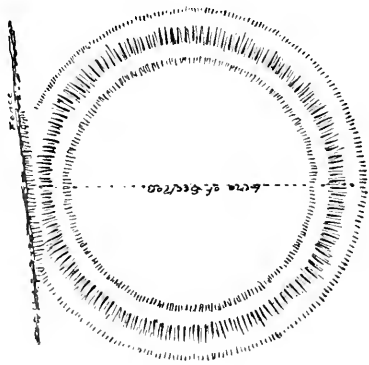


BALLYGOMARTIN ROAD.

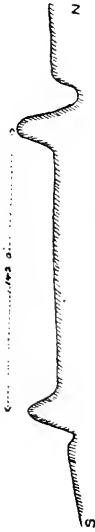


SECTION S. TO N.

N^o 2.



BALLYGOMARTIN ROAD.



SECTION S. TO N.

Natural Slope of Ground is drawn to Nat. Scale

R. 10. 194

Majesty and the Earle, beginning at Glanarm, and so encompassing the ring or circuit (this was Clandeboye, and was what Essex had his eye upon for himself) by the sea coste, the Banne syde, the Loghe syde, &c., and so downward by the edge of Killultagh to Belfast, and from thence to Carrickfergus, and so by Oulderfleet to Glenarm againe aforesaide." Truly a nice little allotment for any man, earl or other, and in this list of places I find "Castell Toome to Masseryn, Belfaste to the Bottom benethe the Cave having two little pyles, Mr. Barkley and Mr. Bruncker, distant four miles from Carigfergus, for the Queen." These two little pyles beneath the cave were either the two square forts—the one in Fortwilliam and the other in Ballyaghagan, close to the Antrim Road in Murray's farm, near to the Castle fence—or else Greencastle and Whitehouse. The Ballyaghagan fort is still fairly perfect, measuring one hundred and five feet from side to side (see plate). The surrounding fosse is about six feet deep, and the outside rampart in some places four feet high. The centre is but slightly surrounded by a rampart. The total diameters of the works is 164 feet and 134 feet respectfully (see plate). Unlike Fortwilliam, this fort has no corner bastions, although Mr. Young states it has at the four corners "like Fortwilliam." Fortwilliam has only two, and this one has none. This fort is situated in the townland of Ballyaghagan, and the Cave Hill, as you all know, was called Ben-Madighan, both evidently some old septal names. An adjoining townland, now called Low-wood, was originally called Lis-toll-gard, meaning the fort of the head garrison, and may have referred to this fortification, or, perhaps, to an earlier fort that existed on the same site.

In the townland of Oldpark there are seven raths, all in fair preservation. Three lie to the south of the road from the Antrim Road to the Crumlin Road, and four to the north, up the slope of the hill.

There is a small double-circled rath in Edenderry townland, nearly opposite the back gate into Woodvale Park, and just a short distance along towards Ballygomartin, after you leave

the Shankill Road (see plate, fig. 1). The rath still retains, clearly defined, two encircling depressions, varying in depth from two to four feet lower than the vallations, which are also clearly defined. The central plain is eighty-five feet in diameter, and the surrounding rampart is about eighteen inches higher than the centre, and the trench is about four feet deep. The whole diameter of the earth-works is one hundred and fifty-eight feet. Dwelling-houses are built quite close to this, so it may disappear at any moment.

A very short distance west of this, in an adjoining brick-field, is a much finer rath (see plate, fig. 2). The total diameter of its earth-works is one hundred and eighty-eight feet, its central plateau being one hundred and twenty-three feet, with a surrounding bank three-and-a-half feet high, succeeded by a trench five feet deep on the south side and seven on the north. The succeeding bank is from one to three feet higher than this trench, and can be clearly traced all round.

The next rath is situated a couple of fields up the Forth River, close to the house of a man called Rusk, and has almost been destroyed by cultivation, but its form can still be clearly traced. Its greatest height is about five feet, and its diameter is about eighty-one feet—the rampart can be traced for about half the circumference.

To the north of Ballysillan House, and in the grounds of the same close to the Crumlin Road, remains a rath with part of its entrenchments almost in their original state. The diameter of the central plain only attains fifty-nine feet, part of the surrounding bank is six feet high, whilst the trench on one side attains a depth of twelve feet. The best part lies to the north, whilst the south-west has been encroached upon by a now ruined cottage. The diameter of the whole works is one hundred and thirty-eight feet.

The remains of a rath exist close to Glencairn (the residence of Josias Cunningham, one of our members); the form alone can be traced. Its diameter was about one hundred and twenty feet, the rampart is about six feet high, but the trench has been

filled up—it has been used as a ring for training young horses. I see by the ordnance map that the municipal boundary passes right through this site.

Further up the road by the side of Glencairn, and nearly opposite Frazer's Loaning, there is a rath, partly planted, on Kirkwood's farm. Its total diameter is about one hundred and thirty-three feet, the rampart and fosse remaining on the one side, but removed on the other. Where remaining the rampart is three feet higher than the central plain, which is one hundred and nine feet in diameter, whilst the trench is six feet deeper than the rampart.

Close to this on the west side of Frazer's Loaning there is another small fort, and there are two others lying between the new Whietrock road and the little white Church ; then down the Whiterock road there is another to the north before you come to what is called Callender's Fort, which was of considerable dimensions, and is situated in the townland of Ballydownfine, or the town of the white fort.

Drawing a line due west from the Linen Hall I think I have mentioned all the raths and forts within a radius of three miles from the Exchange in the Co. Antrim. I leave the other end of the town to some member who may reside on that side.

My intention in placing on record these apparently unimportant details is simply to have a record of the interesting historical features of our immediate district, and to prevent the passing into oblivion of the primitive haunts and residences of the early inhabitants of Dalaradia. The large number of these earthworks that still remain to us, although doubtless many have been removed, conclusively prove that in the early ages the site of our city was not a desert region, but was amply inhabited by an industrious race of people, for the remains they have left clearly prove that they must have been both numerous and industrious. This ancient race has passed away and the land shall know them no more.

'Gainst foemen long battling, at length they went down,
 As truagh gan oidhir na Ch-farradh ! *
 But they've left their deep tracks on the road of renown,
 As truagh gan oidhir na Ch-farradh !
 We are heirs of their fame, if we're not of their race,
 And deadly and deep will be our disgrace,
 If we live o'er their sepulchres abject and base,
 As truagh gan oidhir na Ch-farragh !

The plates are from drawings and measurements kindly made by R. Ll. Praeger and F. W. Lockwood.

John Russell, C.E., member, then read a short paper on "Forts in the Townland of Erenagh, near Downpatrick," giving some interesting details in regard to them.

After some remarks from members present, the meeting was closed, the following new members having been first elected :—
 R. M. Montgomery, Joseph Allen, Mrs. Macrory, Miss Sarah M'Duff, Hugh Morrison, R. L. Woolcombe, M.A.

On the 20th February, 1894, the following papers were read :—
 "The Ancient Church of Lisnagarric," by John Cardwell ;
 "Botanizing in County Dublin," by R. Lloyd Praeger, M.R.I.A. ;
 "Localities for Lepidoptera near Belfast," by Charles W. Watts, F.I.C. ;
 "Lepidoptera of the districts around Lough Erne," by Lieutenant Colonel Partridge. The President occupied the chair.

The first paper was read by John Cardwell, of Tonaghmore, on the ancient church of Lisnagarric, in the parish of Saintfield. The essayist said—One mile to the westward of the village of Saintfield you cross a curious old bridge built by the King's troops in 1798, a short distance from which you come to a green hill dotted over in summer with broom and furze, the view from the crest of which is very fine. Westward rise the peaks of Mourne ; to the east lies Strangford Lough, with Scrabo full

* What a pity there is no heir to their company.

in view ; whilst around lies the old cemetery of Lisnagarric, which contained about two acres. The stones were great, irregular uncut blocks, many of them showing nicely chiselled crosses on their sides. The last interment here was in 1821. On the north side of this graveyard stood the ancient church that tradition says was the fourth built in Ireland. Be that as it may, in the year 1100 Osway, a Danish invader, landed on the shores of Lough Strangford, marched through Downpatrick, and took up his headquarters in the Fort of Ballylone, which has three circumvallations, and was known as Osway's Fort, for here he lived and robbed and plundered at his own sweet will.

Perched on a rock like an eagle's nest in the next townland stood the Castle of Tonart More, the walls of which were four feet thick, the whole enclosed within a stone fort, and the tracks worn by the sentinel on the rock are still to be seen. In the year 1102 Tonart gave Osway battle and was defeated, taking refuge in the crannoge in the adjoining lake, whilst Osway plundered and burnt the Church of Lisnagarric. How long it remained in ruins is unknown, but in the wars of 1641 it was again destroyed by Shane O'Neill. Saintfield was then beginning to grow into a hamlet, and it was agreed to build a new church there, and accordingly the present church was built in 1650. The bell was hung in an adjoining tree, and is still preserved, and probably is the old Lisnagarric Church bell. The memorial stone of the old church, together with the coins, were removed to Saintfield, where the stone may still be seen built into the wall of the present church. In 1857 R. A. M'Ewen excavated the crannoge in the lake, and found the remains of Tonart and his followers. Their shoes were in good preservation, and were sewed with leather thongs ; he also found a canoe hollowed out of a log of oak. The ancient font, now in my possession, was turned up in the old graveyard whilst the same was being ploughed. The foundations of the ancient church were fully exposed during agricultural operations in 1822, but all evidence of their existence has now passed away, even the graveyard

being ploughed and levelled and fenced like the adjoining fields. Curious to state, Bishop Reeves has not referred to this ancient church in his "Ecclesiastical Antiquities of the Diocese, &c.," but Father O'Lavery has a slight note regarding it.

Wm. Gray, M.R.I.A. ; F. W. Lockwood, C.E. ; Rev. C. H. Waddell, M.A. ; and Francis Joseph Bigger having criticised the paper, the essayist replied.

R. Lloyd Praeger then proceeded with the subject of "Botanizing in Co. Dublin," in which he contrasted the flora of Dublin with that of Antrim and Down. He first pointed out the difference in the physical features of the two areas. Dublin County resembled Co. Down in being generally of small elevation, with a group of granite mountains in the southern portion ; but the replacement of the Ordovician grits of Down by Carboniferous Limestone caused marked changes in the flora. The Dublin flora differed from that of the north-east chiefly in possessing a number of limestone-loving species, and some others that affect gravelly and dry places. To illustrate this, mounted specimens were shown of some thirty species which are characteristic of the Dublin flora, all of which are either rare in or absent from the north-east. A few of these have a local distribution, chiefly around Dublin, but the majority of them occur over the south, centre, and east of Ireland, becoming rarer to the northward.

The plants shown included *Ranunculus circinatus*, *Sisymbrium Sophia*, *S. Irio*, *Diplotaxis muralis*, *Papaver hybridum*, *Melilotus officinalis*, *Ononis arvensis*, *Poterium Sanguisorba*, *Foeniculum officinale*, *Dipsacus sylvestris*, *Carlina vulgaris*, *Tragopogon pratensis*, *Leontodon hirtus*, *L. hispidus*, *Crepis taraxacifolia*, *Chlora perfoliata*, *Galeopsis Ladanum*, *Calamintha officinalis*, *Verbena officinalis*, *Primula veris*, *Mercurialis annua*, *Orchis pyramidalis*, *Glyceria aquatica*, *Sclerochloa rigida*, *Hordeum marinum*.

A discussion on the paper ensued in which Rev. C. H. Waddell, Prof. Cole, F.G.S. ; William Gray, F. W. Lockwood, and S. A. Stewart took part.

The paper read by Charles W. Watts will be found in the appendix.

Lieutenant-Colonel Partridge gave a list of the species amounting to 283 found by him during the year 1893. It is understood Colonel Partridge will augment this list next year, and make it as complete as possible, when it may be published *in extenso* in the Club's proceedings.

A vote of thanks was passed to Colonel Partridge for his valuable paper.

Before separating the audience had an opportunity of examining the different plants and lepidoptera referred to in the papers.

The annual microscopical meeting of the Club was held on 20th March, when the accommodation of the different rooms in the Museum was fully taken advantage of by the crowded attendance of members and friends. For two hours the twenty microscopes on the tables were the source of great attraction, it being a difficult task to distinguish or point out the objects that created most attention. Geological subjects were well represented, which may be accounted for by the habitual bent of the Club in that direction, combined with the recent course of geological lectures delivered by Professor Cole. The whole exhibition afforded the greatest amount of interest and pleasure to those present, which was scarcely detracted from by the crush which at times was experienced around the different operators.

Alexander Tate, C.E., presided, and, after a few introductory and well-chosen remarks, called upon P. F. Gulbransen, member, to read a short paper on "Why do objects appear larger when viewed through a microscope?" After the paper had

been read the microscopes were again resorted to until 9.30 o'clock, when a short business meeting was held—the President in the chair.

The Hon. Secretary read the report, which referred to the work of the microscopists last year, and regretted that, in consequence of the section not having a secretary, much had been omitted, which would, however, be remedied during the coming season. Alexander Tate, C.E., was elected chairman, and Dr. St. Clair Boyd secretary of the section, with the following as a committee:—James Stelfox, C.E.; W. S. M'Kee, Wm. Gray, M.R.I.A.; P. F. Gulbransen, Joseph Wright, F.G.S.; H. M'Cleery, and Professor Symington. After the election of eighteen new members, the meeting was brought to a close, it being in point of attendance and in the interest of the exhibits the most successful microscopical meeting ever held under the auspices of the Club. The following were the members elected:—Wm. Gibson, Miss Shaw, Miss Grimshaw, Miss Ethel Boyd, Miss Walkington, LL.D.; James Moore, S. A. Moore, John Kinahan, Mrs. Wheeler, Jas. F. Anderson, John. M. Anderson. Robert Sharpe, Maurice Stubbs, Samuel Stears, S. B. Smyth, M.D.

At a meeting of the Club held in the Museum, College Square North—John Vinycomb, M.R.I.A., presiding—William Gray, M.R.I.A., read a paper on “Our Holy Wells: a Folklore Chapter.”

He said many analogies might be drawn between the history and characteristics of our race and the history and characteristics of a single member of the race. As with the individual, so the race may be said to pass through the stages of infancy, childhood, maturity, and decay. In dealing with our present subject we may almost pass unnoticed the obscure period of our race's infancy. We dare not contemplate the possibilities of maturity, or, the consequences of decay, but the childhood or, preparatory stage of mankind is full of interest, and may well challenge our

attention. During the infancy stage the bountiful hand of nature, like a tender mother, supplied all the immediate wants of mankind, without care, effort, or thought on the part of man, but primitive man soon discovered that this felicity was not to last, and that he was born to a heritage of labour and strife. One of the first practical lessons acquired was a consciousness of the limitation of his knowledge and the deficiency of his experience, and, like a precocious youth, his expanding mind devoted itself to observation and inquiry.

We naturalists can fully understand what a powerful effect the objects of nature must have had upon the expanding mind of primitive man. The various forms of animals life that shared his companionship, the verdure of the vegetable world that beautified the landscape, "the seasons ever rolling round minutely faithful," the voice of the thunder, and the roar of the cataract, we can well understand how all this must have impressed primitive man in the dawn of his youthful intelligence. Then, everything was so strange, so wonderful, and, to his childlike fancy, apparently the work of beings, superior to himself, whose personality he but vainly imagined, and whose power, so far beyond his own, he feared and worshipped. Hence all nature was to him tenanted by living beings, each in their allotted sphere working out the ever-changing phenomena around him, and producing the results for good or evil that most affected his destiny. In this recognition of cause and effect we have the fundamental basis of all scientific research, and in the conception that the moving cause was a being active and capable we have the goal of all true worship. The methods employed in the investigation of the cause or causes of natural phenomena were extremely varied, and the paths pursued towards the goal of religious truth were extremely tortuous, and in the development of human culture both were influenced, modified, and readapted under the varying circumstances of time, the migration and co-mingling of tribes, the dispersion of the human family over the earth, the growth of natural characteristics and the formation of settled communities ; and,

yet, while the primitive impressions were thus thickly incrustated by accumulated modifications, they constantly crop up through every covering, and among every people, thereby demonstrating the antiquity and universality of the primary appreciation of a cause for natural phenomena, and a recognition of its author or authors.

In the history of individuals we know how powerful are the early impressions of youth, and how indelibly they are engraved on the memory, presenting themselves in all their freshness and vigour amidst all the varying vicissitudes of an extended lifetime. It is even so with the early impressions of the race. The mythology of Greece and Rome, a development of this idea, was composed of a vast assemblage of divinities or celestial beings. The hills and the valleys, the groves and the rocks, the seas, lakes, rivers, and pools had each their attendant divinity. This polytheism was not confined to the peculiarities of the natural world ; it included divinities representative of all the fancied qualities of the ideal world ; even distinguished heroes, sages, and artists were exalted to the position and dignity of deities, and were included amongst the celestial hierarchy ; and the labours of poets and artists were mainly employed in expressing the doings and characters of the gods. The old Norse myths are founded on the imaginary characters and actions of ideal beings who represented the various functions of nature, and in the popular mind these supernatural beings were endowed with qualities and habits for good or evil similar to the people themselves. In a similar manner throughout the world the great tribal or natural gods represent the personified forces of nature—a shadowy world of supernatural beings possessed of the same desires, habits, and passions as the people who worship them. This all-prevailing impression seems to imply a universal inner consciousness of a spiritual world which is awakened in the mind by the more distinctive phenomena of nature, which are therefore worshipped as the tangible representatives of living beings who control the destinies of mankind for good or evil.

In the progress of civilisation the sorcerer and the exorcist professed to be able to drive out the demon of affliction and to cure the diseases that afflicted man, and in modern times the scientist teaches that our diseases are often attributable to certain forces or agencies of nature operating as living beings in the form of microbes, bacteria, &c., endued with various powers for good or evil. Such modern conclusions to a certain extent justify the early impressions of primitive mankind as to the powers and actions of natural forces. Of the various phenomena of nature supposed to be under the care of special divinities, water and trees occupied the most prominent and important position, and had the widest influence. All naturalists will understand why this should be, when we consider the wonder-working effect of water in the physical world, and the growth, development, and beauty of the vegetable world, the stately grandeur of the forest, and the grace and dignity of certain trees.

The antiquity and universality of the adoration of wells and trees is established by ancient authors and modern travellers. The classic writers frequently refer to wells and fountains and the respective powers of each. Among the Greeks every river, fountain, or spring had its special deity. Seneca says—"We worship the head of great rivers, and we raise altars to their first springs." The Germans, Gauls, and other natives of Europe regarded lakes and rivers as sacred. The American Indians pay special respect to their lakes, as the eastern Indians do to the river Ganges, and as Jews and Christians respect the Jordan and the Nile. Sir William Bentham in his "*Gail and Cymbri*" says—"The Celts were much addicted to the worship of fountains and rivers as deities." Similar evidence can be furnished as to the respect for trees, particularly those of venerable appearance, which are supposed to be the homes of the spirits of the woods.

Perhaps, with reference to Ireland, we could not select a better case than Lough Creevy, in County Meath, to show the connection between the old Celtic and the modern Christian

reverence for lakes and wells and trees in this country. Eugene A. Conwell's description of the discovery of the tomb of Ollamh Fodhla demonstrates that this locality was once the scene of an important Pagan station, and the site of numerous Pagan monuments that still remain as silent witnesses of the remote past. In the manuscript materials collected for the illustration of local history during the progress of the Ordnance survey, the late Dr. O'Donovan has shown that "every place in Ireland bearing the name of Creeve had originally a sacred tree of widely extending branches for the purpose of inauguration, or to commemorate the death of some famous person." We have, then, in Lough Creeve, an example of the survival and combination of the two forms of primitive faith—the respect for water and the reverence for trees, with which our holy wells are so intimately connected. As Mr. Conway observes—"It is a very remarkable coincidence that up to a recent period, and indeed not yet quite given up, a large gathering of the people, or 'patron,' extending westwards from St. Kieran's Church and Well, was held in this plain during the first week of August, the period of the year for the celebration of the famous fair of Taillten ; and this is the more remarkable inasmuch as the festival of St. Kieran, which would be the day naturally and usually set apart for the celebration of the 'patron,' in honour of the patron saint of the parish, occurs on the 14th of June, the recorded day of St. Kieran's death." This demonstrates that the ceremonies at one time celebrated in honour of Pagans survived until the Christian era, and the early Christian missionaries consecrated for divine purposes the Pagan places of assembly and worship, and the homage paid the original personage was transferred to the saint who became the patron of the place ; or, in other words, the modern patrons or "patterns" held at holy wells are the survival of the still more ancient gatherings of the Pagan Irish ; and that the Pagan reverence for water, rivers, and wells was transferred to the holy wells which were consecrated by the early saints, sometimes the direct survivals of Pagan fountains, and sometimes as wells created or adapted for the purposes of baptism.

In the early annals of Ireland there are many references to wells, and their use in the baptism of early converts. In Dr. Reeves's "*Adamnani Vita St. Columbæ*"—"St. Columba strove against the Magii (Druids) at a well in the country of the Picts. He exorcised the heathen demon of the well, which thereafter, as a holy fountain, cured many diseases." In the "*Life of St. Columbkille*," preserved in the *Leabhar Breá* in the library of the R.I.A., it is said—

He blessed three hundred miraculous crosses,
He blessed three hundred wells that were constant.

At Durrow Abbey, King's County, there is a Celtic cross to St. Columba, near which there is a holy well, with the following inscription:—"St. Columba used this well when he preached the Gospel, and built an abbey near it A.D. 550—

Here angels shall enjoy my sacred cell,
My sloe, my nut, my abbey, and my well.

According to Colgan, St. Kieran studied at Rome, and met St. Patrick in Italy, who desired him to go before him to Ireland, and at the Well Fuaran, 'a living fountain,' about the centre of the kingdom to build a monastery, where he (St. Patrick) would afterwards meet him. Whether such conversation took place or not, it is certain that Birr, which is only a few miles from the ruins of Seir Kyran, was long reputed to be the centre of Ireland, while it is also true that a small stream, even yet, called Fuaran, still purls away on the east side of the ruins at Seir Kyran; to the south of these ruins there is still likewise to be seen the holy well, or 'living fountain,' supposed to have been then alluded to by the Apostle of Ireland." Clonmacnoise was known by many different names. "It was also known as 'Artibra,' meaning 'of the wells,' of which there are two here, the one dedicated to St. Kieran and the other to St. Fineen." "The Annals of Clonmacnoise," compiled by the Abbot Tigernagh, informs us that a person named Torbaid was Comorban of St. Patrick previous to the year 758, when his son Gorman died on a pilgrimage at the Well of St. Fineen, at Clonmacnoise.

Thus we find the Well of Fineen resorted to for religious purposes more than 1,100 years ago, not very long after the introduction of Christianity into Ireland.

The Christian forms of worship substituted for the Pagan rites and ceremonies at wells, fountains, and other places of assembly fell into disrepute in the course of time wherever there was a departure from the original simplicity of the early Christian practices and a return to the scenes of revellings and disorder characteristic of the old Pagan popular assemblies. The tendency to degenerate was due to an inherent weakness in the policy of early Christian missionaries who were unable to completely stamp out all the Pagan rites and popular customs, and therefore the missionaries were obliged as a matter of policy to adopt a compromise, retaining such popular rites and customs as were considered innocent amusements and engrafting upon them the introduced formalities of the Christian ritual.

This policy as enforced by Pope Gregory is embodied in a letter written about the year 601 A.D., and addressed "To his most beloved son, the Abbot Millitus," who was sent by the Pope to Augustine, first Bishop of Canterbury. The full text is given in Bede's Ecclesiastical History, Book I., chap xxx. Under the policy thus recommended the feasting and amusements that followed the old Pagan rites were tolerated "to the end that whilst some gratifications are outwardly permitted them, they may more easily consent to the inward consolation of the grace of God." Unfortunately the "gratifications" thus "permitted" the early converts, became afterwards the chief attraction on the day of dedication, and the religious observances on the Patron's day degenerated into the "pattern" or "fair" that subsequently became the fruitful source of riot and disorder down to our own day. This pattern or fair originated with the trade carried on in former times by those who provided refreshments for the people who assembled at the wells or places dedicated to some saint who became the Patron of the place, and this annual gathering on the Patron's day was

called a "pattern," the original intention was for worship and religious festivities, but the festive soon absorbed the religious and all forms of abuses followed, and hence the gatherings were condemned by the Church.

The early Christians strongly condemned the old Pagan rites and ceremonies connected with wells, rivers, and fountains, mainly because of the riotous excesses in which the votaries indulged. Making offerings to wells, trees, and earthfast rocks is denounced in a Saxon homily preserved in Cambridge Library. The Council of Tours A.D. 567 also prohibited their worship. St. Boniface, in the eighth century, in his efforts to advance Christianity, cut down the sacred oaks dedicated to Pagan deities. There are many similar interdictions against the ancient well and tree worship, and yet the worship of holy wells survives in variously modified forms throughout the length and breadth of Great Britain. Much valuable information has been compiled in the work on "The Holy Wells of England," a list and descriptive particulars being published by Robert C. Hope, F.S.A. Interesting particulars of the holy wells of Scotland may be found in Forbes Leslie's "Early Races of Scotland," Sinclair's "Statistical Account of Scotland," and in the translations of the Scottish antiquarian societies. Of our own North of Ireland wells an interesting paper written by Richard Dobbs in 1683 contains a chapter on remarkable wells in the County of Antrim. This is published in Rev. George Hill's "Macdonnells of Antrim."

Many years ago, P. Dixon Hardy published a small book on "The Holy Wells of Ireland," dwelling chiefly on the alleged "superstitions and degrading practices" connected with them; the same fault mars the descriptions given in "Hall's Ireland."

The Rev. James O'Laverty's work on the "Diocese of Down and Connor" contains numerous references to our North of Ireland wells.

After quoting very largely from numerous correspondents in various parts of Ireland with reference to Holy Wells, Mr. Gray said—Coming nearer home, we have the following from Dun-

given, County Londonderry :—"The Holy Well (St. Patrick's) is situated half a mile south of Dungiven, and a quarter of a mile from the old abbey O'Cahans. It was that used by the old monks of the monastery, and very probably the veneration of the people and its reputation as a holy well take their origin from its foundation. The faithful used to make stations of this well, and even to this day are continued, as the pieces of rag tied on the shrubs surrounding it testify. It appears from local tradition that previous to making the station at St. Patrick's Well six other wells at some distance from each other in the neighbourhood were visited, so that St. Patrick's concluded the station. The stone round which the penitents used to go after performing the ceremonies at the well is in the river beside the old abbey, known as the 'Salmon Leap,' and the people in the neighbourhood show the print of footsteps in the stone, at the same place, which they say are those of St. Patrick."

A correspondent from near Claudy, County Derry, writes :—"There is a lyn, or pool, in the stream, just a little below Kilgort Bridge, called 'Turish Hole,' or 'Turish Lyn.' Some people still believe that by bathing in this pool cures can be obtained for any description of disease, and the traditions and folk-lore are that cripples were cured at this place, and left their crutches behind them there. Back-going children when washed in this pool became healthy. In fact, tradition says that immersion in the pool was a cure for all manner of diseases, sick headache included. The date of the ceremonies is May Eve (last day in April), when the persons wanting a cure bathe or wash themselves or the diseased part in the water, and repeat some prayers. The offerings (which are left on a bush beside the lyn) are of different kinds. Often a piece of cloth is tied to the bush, sometimes a lock of hair, and sometimes three white stones picked up from the pool. Tradition does not say when or by whom the lyn was blessed, but the custom of offering prayers there indicates that the people regarded the place as holy. Tradition says that a very large trout was in Turish-o-Lyn, and that all who had the good

fortune to see the trout on May Eve were sure to get cured. It is said that this trout was caught by some man, and when he had it on the coals cooking it for his dinner it leaped out of the door and went back to its lyn again, but it never let itself be seen afterwards."

Mr. Gray also very fully described a large number of other wells in the North of Ireland, including the following:—Cranfield Well, on the north shore of Lough Neagh. The tree over this well, as in many other cases, is decorated with old rags, and crystals of carbonate of lime are found in the well, which are said to be very lucky. St. Bridget's Well and Stations at Faughart, near Dundalk, where the trees are also decorated with rags, and a stone in the stream shows the impression of St. Bridget's knees. At the well near the old church of Faughart there was formerly a scull from which visitors drank the well water. Mr. Gray described a number of wells called Tubberdoney, such as the one at Kilrea, one near Cloughmills, one near Dervock, and one near Castlewellan. All the wells called Tubberdoney were supposed to have been dedicated to their respective patron saints on Sunday. Mr. Gray also fully described Kilbroney Well, near Rostrevor; Struil Wells, near Downpatrick; St. Patrick's Well, at Saul, County Down; St. Patrick's Well, near Ardglass; and the old well of Tubbernacarrick, near Kirkcubbin, County Down. All the Northern wells and several from other parts of Ireland were illustrated by limelight views thrown on the screen by Mr. Nicholl. In describing the Northern wells, Mr Gray stated that we have in our own locality remains of the old practices at wells, such as paying special respect on certain days, decorating the adjoining bushes with rags, and raising stones and cairns and making penitential stations. Mr. Gray enlivened his lecture by telling appropriate anecdotes and exhibiting many relics brought from holy wells.

Seaton F. Milligan, M.R.I.A., made a few remarks, congratulating the Lecturer upon his admirable discourse.

A meeting of the Club was held on 10th April, in the Museum, when there was a large attendance. The President presided, and briefly introduced George Coffey, M.R.I.A., of Dublin, who delivered a lecture upon the "Pagan Cemeteries and Burial Customs of Ireland."

The Lecturer spoke for nearly an hour, tracing the different Pagan ceremonies in connection with the disposal of the dead from the very early practice of inhumation, followed by the almost universal custom of cremation, which in Christian times again gave place to interment. The great burial tumuli on the Northern banks of the Boyne, about six miles from Drogheda, were especially dealt with. They were conclusively proven by Mr. Coffey to have been the historical "Brugh-na-Boinne," or city of the dead, used by the ancient kings of Tara from the first century till the introduction of Christianity by Saint Patrick, King Cormac being the first of the regal dead who was not interred in this Royal mausoleum. He, having embraced Christianity, did not wish to be interred with his Pagan ancestors, and so was interred at Knocknaree, to the south of the Boyne, with his face to the east. The Lecturer also explained in detail the monumental remains at Loughcrew, elucidating a theory for the erection of a cairn, not covering remains, trying to prove that such a monument was intended as a cenotaph to appease the spirit of the dead. The lecture was copiously illustrated by lantern slides, shown by W. Nicholl, of the different remains, many of them being very cleverly taken in the dark interiors by the aid of magnesium wire, showing the quaint and curious ornamentation of the internal slabs.

W. H. Patterson, M.R.I.A., moved a vote of thanks to the Lecturer, which was seconded by William Gray, M.R.I.A., who said Mr. Coffey had afforded the Club an excellent treat by his learned and clever lecture, and pointed out the advantages to be derived from the study of archæology, as it brought together in perfect harmony the different sections in religion and politics, and helped to do away with the asperities existing

PHIRION EALADAN BEUL-FEARSADAE.

AN T-AONMÍAD BLIAÐAM ARI TUMOÐARO 1893-4.

Beiré tionól ari oét ve élog am épiátnóna Dia Maire
an 17 ve'n Abrián mpan m'breugan-lann a 5-ceatarmac
na Coláirre, éuaiḡ. Léiḡfeam leiḡinn mair ro rior:—

Paorraig Sorep O'Seaḡa, - - Tuairmḡ ari éail an rang
ḡaeóilḡe.

Taḡḡ mac an báiro, - - - Ceatol ó homei i
nḡaeóilḡe.

An liaḡ mac buiré, - - - Oileagria ari ḡaeóilḡe.

Diaimaro ḡairait O'foólu, - Sgeul 7 aetarmḡaó.

Prompeur S. biḡḡer, - - - Cairioil ari Ebire.

Miceál O'ḡmoóca, - - - Sgeul 7 aetarmḡaó.

An t-Oiḡ ní Meallagán - - Feairḡal óḡ Mac an báiro.

E. Muiréireac, - - - Romn beaḡ ó'n nḡaeóilḡe.

Prompeur Sorep biḡḡer.

Rún-éleiréac ḡan ioc.

between the North and South, and in this respect he considered the Club to be doing good work. S. F. Milligan, M.R.I.A., supported the motion, which was conveyed by the President and suitably acknowledged by Mr. Coffey.

The following new members were then elected :—W. Faren, Chas. W. M'Minn, and George D. Burtchæll, M A., M.R.I A. : Miss Lamb, Miss Johnston, and Miss Harkness.

An extra meeting under the auspices of the Celtic Class was held on the 17th April, the President in the chair. P. J. O'Shea, Member, who had kindly conducted the class during the Session, read the programme for the evening in Irish (a copy of the programme is subjoined). and afterward submitted the following report.

This class was conducted by me during the Session that has ended. The students, whose numbers varied from 16 to 20, met on Mondays at 8 p.m. in the Museum, and made considerable progress.

T. Ward, Member, then read an extract from the Irish translation of Homer.

J. St. Clair Boyd, M.D., Member, then read the following paper on the Irish Language :—

The various claims put forward as to the origin of the Irish language need not be discussed in a paper such as this. However, the following extracts from a work on this subject, published this year in Edinburgh, under the title "Eire Ard Inis na Righ," may prove of interest.

"There is ample testimony from classical writers of antiquity that Ireland was known, and that it was inhabited by people possessing a civilisation, not greatly inferior to that of the eastern shores of the Mediterranean Sea, many centuries before the Christian era. In the 6th century B.C., a poem, ascribed to Onomacritus, makes mention of Iernis (Ireland), without mentioning the larger Island of Britain ; and it is not unlikely

that to mariners, Ireland would be known earlier and better than Britain, since it lies due north from the west coast of Spain, and even in the time of Tacitus (A.D. 84) its harbours were preferred to those of Britain. Another Greek author writing about 330 B.C. mentions both Albion and Ierne, these being the ancient Celtic names of Britain and Ireland. But a much later Latin author, quoting from ancient Punic records, tells us that Himilico of Carthage visited the Oestrurnides or Scilly Islands, and the Sacred Island beyond in the neighbourhood of Albiones. Himilico mentions the commerce between Gades (Cadiz) and the Tin Islands and says that the husbandmen or planters of Carthage went also to those islands to colonise. He also mentions graphically the populousness of Ireland, the turfy nature of its soil, and the hide-covered boats of its inhabitants; above all, that it was then and had been from ancient times called the Sacred Isle. Himilico's voyage was made before B.C. 350, but how much earlier is not known.

A passage in Aristotle (B.C. 350) speaks of the Carthaginians having made settlements in an island, many days' sail beyond the Pillars of Hercules, in which were navigable rivers, abundant fruits, and dark forests. This is believed to refer to Ireland. Sir W. Betham says—"When the Greeks were in a state of comparative barbarism, the Tyrian and Sidonian navigators had explored not only the Mediterranean, but the Atlantic, to the coasts of Spain, Gaul, and the British Isles." To nautical trading and manufacturing enterprise, they added a knowledge of letters, which they are said to have communicated to the early Greeks. Their language bore a close affinity to that of the Hebrews; but that their language bears a still stronger resemblance to Irish, is a discovery of quite modern times. This discovery, made by an Irish scholar O'Neachtan, and given to the world by General Vallancy in 1807, is of very great importance, and establishes the antiquity of Irish as a spoken language. Concerning extracts from Punic speeches introduced in the "*Poenulus* of Plautus," a Latin play written at Rome about 200 years B.C., Sir W.

Betham says there can be no doubt that the speeches in the *Poenulus* are Gaelic. There is a word for word correspondence throughout between the Punic of Plautus and the Irish of O'Neachtan, while the whole passage makes good sense in strict accordance with the argument and Latin text of the play. Surely the Irish language is worthy of special study, because of its great antiquity and the light which it may yet throw upon the origin of various nations and other unsolved problems of history.

Several Irish idioms are in use among our peasantry. The "says I," "says he," heard so frequently is the Irish form in which the verb comes before the pronoun. In Irish "thirst" is said to be on a person—we have frequently heard complaints of the "druth being on people." To give a name to a thing is "to put a name on. Price is said to be on a thing—we may have heard the question, "How much have you on the cow?" Children often talk of "getting" their lessons—this is the Irish idiom for learning them. "Put a coat about you," is the idiom for put on a coat. An Irish tense called the habitual present is heard in the expression "I do be," and the habitual past, "I used to be." The word "partan," a crab, seems to be the Irish word *partán*. The common salutations of the peasantry, "God bless the work, also when churning, "I wish you luck on your churn." When one enters a house he is often saluted by "Is this yourself?" "Give me your hand," is the equivalent of "Shake hands." The interjectional phrase, "Ara musha, how do you do?" and the peculiar use of the phrase "at all at all." Even in the North of Ireland the embers from which a peat fire is kindled are called "gries hagh." The phrases "True for you"—that is true, and I would not "let on."

The Celtic language has two main divisions—the Gaelic and the Cymric. Each of these has three branches—the first includes the Irish, the Gaelic of Scotland, and the Manx. The second includes Welsh, Cornish, Breton or Armoric. Irish Cornish, Welsh, and Armoric have an ancient written literature; Scotch gaelic has none, distinct from Irish.

Irish literature is divided into three stages. 1st, Old Irish, 8th to 12th century, as the Irish of the Book of Armagh; some passages in the Book of the Dun Cow, and the language of the Glosses; little of it is preserved in Ireland. This was the classical age of the Celtic which after the Anglo-Norman invasion gradually lost its purity and native simplicity. 2nd, Middle Irish, 12-15th century. This is the language of our most important manuscripts, as the Book of Leinster, Book of Dun Cow, Leabhar Breac, Book of Ballymote, and Annals of the Four Masters. 3rd, Modern Irish, 15th century, till present time, as Keating, Ossianic Tales, etc.

Literature classified into—(1) Ecclesiastical and religious writings; (2) annals, history, genealogy; (3) tales, historical and romantic; (4) law, medicine, and science.

The Glosses are the most ancient extant of Irish literature; they consist of explanations of texts of Scripture. The "Book of Armagh," early in 9th century, has some old Irish interspersed through it. Tripartite life of St. Patrick, date from 8th to 10th century; copies are in T.C.D., Oxford, and British Museum. The "Leabhar na Geart," or "Book of Rights," written about the 14th century; copied from older manuscripts; language very ancient in style. The "Leabhar na Heera," or "Book of the Dun Cow" (11th century), now in the Royal Irish Academy, contains romantic tales in prose, elegy on St. Columkille, &c. The "Book of Leinster" (1160), in Trinity College, Dublin, contains historical sketches, romantic tales, topographical tracts, genealogies, &c. The "Leabhar Breac," or "Speckled Book of MacEgan," in Royal Irish Academy, date end of 14th century, contains a lot of Latin mixed with Irish, and treats principally of religious subjects, also lives of St. Brigid, St. Patrick, St. Columkille, and Alexander the Great, date end of 14th century. "Book of Ballymote," in Royal Irish Academy (date 1391), contains prose and verse. "The Yellow Book of Lecan" (1390), prose and verse, historical, topographical, sketches of several battles, &c. All the above five are published in fac-simile by the

Royal Irish Academy. Many others are preserved in the Royal Irish Academy and Trinity College, Dublin, such as the "Book of Lismore," "Book of Fermoy," the "Book of St. Mary," and others that have no special names. Trinity College, Dublin, has over 140 volumes of manuscript Irish literature, many of which are written on vellum. Irish manuscripts are to be found in the Imperial Library, Paris; Library of Milan, Library of Ostend, Francis College, Louvain; Burgundian Library, Brussels; College of St. Isidore, Rome; and the Vatican Library.

The Latin MSS. from Glosses of which Zeus compiled his "Grammatica Celtica" were—(1) "Codex of Priscian," Library of St. Gall, Switzerland; (2) "Codex of St. Paul's Epistle," Library, University of Würzburg; (3) "Latin Commentary on the Psalms," in Ambrosian Library, Milan; (4) "Codex of Venerable Bede's Works," at Carlsruhe; (5) "A Second Codex of Priscian," at Carlsruhe; (6) a miscellaneous codex preserved at St. Gall; (7) a codex preserved at Cambray.

In a speech of the late Lord O'Hagan, at Queen's College, Belfast, "he regretted that there was not a professor in that college to train up future O'Currys and O'Donovans, so that the remnants of our old literature, scattered in mouldering manuscripts through the libraries of Europe from Copenhagen to the Vatican, might be arrested from destruction, and made amenable not only for the glory of Ireland, but for the welfare of the world."

I conclude by mentioning that the "Gaelic Journal" is now published monthly. At present it contains a system of self-instruction in Gaelic. Those who look forward to joining our class next year would do well to avail themselves in the meantime of the lessons in it.

T. G. Foley, Member, then read an interesting fairy tale in Irish.

Francis Joseph Bigger, M.R.I.A., Honorary Secretary, then read the following paper on Local Names of Places:—

One would think the plantation of our district in the 16th

and 17th centuries by English and Scotch settlers would have entirely altered our local names, but the contrary seems to be the fact, especially in the Scottish districts where the transition of a Celtic name from the Irish pronunciation to the Scottish pronunciation was an easy one, and then in nearly all the country there was a sufficient number of the Irish remaining to hand over the local designations to the new comers. We thus have in Antrim and Down a much more correct rendering of the ancient names than what exists in the pale along the eastern coast. What, however, we have retained in nomenclature, we have in many cases lost in more material evidences of a past history. There is not a district where raths and cromleacs have not been destroyed or souterrains torn up, where old castles and abbeys have not been used as quarries, and ancient grave-yards ploughed over and cropped by the husbandman ; but the ancient names remain, in many instances in a corrupted or mangled form but still sufficient to attest a former history, and the kernels of many wonderful historic truths are lapped up in them.

To any intelligent person with a taste for history or antiquities there could not be a more fascinating study than this, and it is here the value of a knowledge of the native tongue will be most esteemed. Our local names are so minutely descriptive that there is not a mountain, hill, river, lake or glen without its distinctive appellation that either points out its physical features, its former owner or occupier, or some important event worthy of record that occurred in its vicinity. It is impossible to over estimate the importance of such a study as this to the topographer. Not only is he enabled to trace to its proper position the site of an ancient church, or the field of a distant encounter or the subject of an early grant, but he has also materials for the correction of etymological fallacies and the establishment of a true standard of interpretation. (*Reeves*). We have names that are the keys to the most romantic events, a hidden book to the uninitiated, and as in nature a man who is not a student of her mysteries may walk by field and flood and

never have his eyes opened to, nor observe one solitary vision of the greatness, the grandeur, and the minuteness of the wonders and beauties of creation, so the historical student who does not know and cannot read the facts and fancies concentrated in our ancient names is, as it were, talking in a language he does not understand, and using names that are mere sounds expressing nothing, and bear no relation to the story that has passed away.

Our counties and baronies, though connected with ancient chieftainships, are of Norman origin, the earliest dating from the commencement of the 13th century. The parishes are entirely ecclesiastical and have matured from the 12th century, whilst the townlands, the smallest territorial denomination, may be considered the most ancient, as they designate the earliest description of the smaller tracts of land and can be traced back till the 8th century. It has been calculated that there are 66,700 townlands in Ireland, each averaging 330 acres, and as most of these bear ancient names, we can conjecture what an enormous amount of historical information must be there stored up.

Bishop Reeves tells us :—In Down the prevailing denomination was the Ballyboe, or cow-land, which was estimated at three score acres, being the amount of land that could be ploughed with one plough in a year and a day. Three Ballyboe formed a quarterland, and twelve the Ballybetagh. Now, this word Ballybetagh has a curious history. In ancient times an Irish chieftain usually established within his territory a sort of public hostelry, over which he placed an officer, called a biadhtach (betagh) or food man (from biadh, food). This biadhtach was given a tract of land, equal to twelve ballyboe, rent free on condition that he should supply food and lodging without charge to travellers and to the chief's soldiers whenever they happened to march in that direction. The quarterland was, of course, the quarter of a ballybetagh, and in Antrim we still have the "four towns" of Ballynabarnish, Kilgreel, Craigarogan, and Moylusk, which are held by a landlord separately from the adjoining land. We have also the eight towns of

Muckamore, the sixteen towns of Connor, and the sixteen towns of Antrim. We have in Antrim ecclesiastical divisions of considerable antiquity, designated granges, which are ex-parochial, but include townlands in their area the same as parishes. These lands were formerly annexed to religious houses. Thus we have the Grange of Umgall (the place of the stranger); the Grange of Moylusk (the plain of the Macluskey family, a section of the O'Cahans), where there stood a religious house of the knights of Saint John; the Grange of Ballyrobert; the Grange of Muckamore (Magh-comair, the plain of the confluence of the rivers); and many others.

Since the plantation a great number of new townlands have been created, in many cases from the ancient names, but often from English appellations: thus we find in the grant of the Hertford estate in County Antrim, being the principal part of ancient Killultagh, fifty-two denominations are recited; whilst at the present the same estate, which has been unaltered for the last two centuries, and is encircled by a great ring fence, contains about 150 townlands. The Government Census Book only requires the addition of another column, namely, an etymological one, to make it an invaluable store-house of historical information unequalled by any previous publication. The word bally, meaning a place or town or district, occurs in 6,400 townlands in Ireland. Cill, a church, occurs 2,890 times—showing that in the ancient days there were more churches than there are at the present time in Ireland. Drum, a ridge, occurs 2,000 times. Cluan, a meadow, occurs 1,680 times. Knock, a hill, 1,600 times. Lis, an enclosed abode now called a fort, 1,380 times. Derry, an oak wood, occurs 1,310 times, showing clearly what a rich wooded country Ireland was, and how, doubtless, the “wooden walls” of England largely consisted of Irish oak. This richness and wealth of verdure has been beautifully expressed by Sir Samuel Ferguson.

Mileacan dubh O!

There is honey in the trees where her misty vales expand,
And her forest paths, in summer, are by falling waters fanned,
 i' the yellow sand,
On the fair hills of holy Ireland.

The O'Neills were a powerful race for many centuries in our district, but while their strongholds have long passed away, their names are still handed down to us. We have Conn's-water, Conn being a common name with O'Neills who had a princely residence at Castlereagh—the king's castle, or, as some read it, the grey castle. Skeig-oneill* means O'Neill's thorns or bushes, whilst Legoneil or O'Niell's hollow quite expresses the topography of the present unromantic village in the mountains. MacArt's fort dominates all Belfast as the O'Neills formerly dominated all Ulster, and was clearly a stronghold of that great clan—the same name is probably used in Ballymacart, whilst Ardoyne, or Owen's Height, tells of another member of the same family.

Belfast is encircled with hills and some of these bear ancient names. The highest, Divis—dubh ais—means the black hill, which is also the English name for two adjoining hills. Beside them is Altigarran or the mountain of the shrubbery, whilst beyond it is Alt-na-caedh (key) or the marshy hill and on the back of Divis is a carn called Carn Shane Bhuidhe—or the carn of Yellow John—one of the clan O'Neill. At Legoneil is Alt-conna or the height of the firewood. Ben-Madighan (Cave Hill) is doubtless called after Madidhan, a son of the King of Ulidia, who was killed in 838 by his brothers. Madidhan avenged his father's death and reigned 15 years, dying in the year 855 in a religious house. The whole range is described in the Down Survey as Slieve-na-Geurach, meaning the mountain of the sheep, which is verified by the fact that Sheep-heads is the present name for the large mountain track to the north.

The hill at the back of the Cave Hill is called the Collanward, being one of the few remaining Danish names in our district—ward meaning a "look out," and one who knows this hill as I do will at once observe the splendid outlook it gives over the lough and surrounding country, and will instinctively conjure up all sorts of apparitions of bloodthirsty Norsemen looking

* In the Chichester grant this is designated Skeigonearl, and may have some reference to the slaying of the Earl of Ulster, near the ford of the Lagan.

over the sea for that help from their kindred which was sure to come when there was any looting to be done. The other Danish names remaining to us are, Olderfleet at Larne, which is a corruption of Wulfrichford, and was applied to the water opposite the Corran (so called from its shape, resembling a sickle or reaping hook). Strangford tells its own meaning, and anyone who tried to cross this ford on an ebb tide would feel it as well. There is an ancient river running down the centre of High Street called the Farset, a word meaning a sandy bar or mouth of a river and descriptive of the condition of the river in early times where it joined the Lagan. The name of our city is derived from it Beul-a—mouth, and Farset a sandy beach; Beulfarset or Belfast. The Lagan, known to Ptolemy as the Logia, is so called from a hollow in its course, whilst its tributary the Blackstaff rejoices in the euphonious Irish name of Owenvarra—the English name being a translation of the ancient one. This river was doubtless once staked in or had a ford of stakes blackened by time or peaty water. The districts surrounding the Owenvarra is called Cromac, meaning a sloping or bending place, and probably refers to the old crooked course of the river. The river Owen O'Cork may be an old name also and mean the river of the rough lands.

There is a townland between the Antrim Road and Carnmoney Church-yard called Drumnadrough, meaning the ridge of the Druids. There is still a fort in the centre of it. The townland upon which the Throne Hospital stands is called Ballygolan, or the place between two rivers. This is quite correct, but the rivers are small; the one at the Cavehill side divides the parishes of Shankill and Carnmoney. Above Carnmoney Church—Carnmoney means the carn on the mountain, the remains of which were recently removed—there is a fine ring fort called Dunanne, the fort of the golden chain or collar, referring doubtless to some long-forgotten event in its history. Near to this is Glengormley, which may mean the dark blue glen, or more likely refers to the Clan Gormlath (Gormley) which sprung from Muireadhach, whose son

Madadhan probably gave his name to the adjacent hill Ben-Madighan. The river passing through Glengormley and down to Whitehouse is called the Glasnabradan, a name now scarcely known, and the significance of which modern manufactures have spoiled. It means the stream of the salmon—Glaise na'm-bhradan. On the slope above Glasnabradan, at Glengormley, is Tobarcooran, or the bubbling well, the late residence of one of our presidents, General Smythe, M.R.I.A. To the south-west rise the slopes of Ballyvaston, the town of the churl, Ballywonard, the poor town, and Ballywonard, the town at the foot of the height. Close at hand, flowing through Hyde Park, is the river Aghnatallagh, or the field of the hearth. The hill beyond is the Bouchaill, or the hill of the standing stone—literally, the hill of the boy, a large stone having that appearance at a distance on the horizon—upon which there are still the remains of a cromleac. This is in the townland of Craigarogan, or the rock of prayer, in which is situated a rocky eminence called Gocraig, which may mean the rock of the smith; and close by is Shaneboy, or the land of Yellow Hugh, probably an O'Neill. Adjoining is the largest townland in our district, containing nearly 4,000 acres, and known as Ballyutoag, the town of utag, the broken arrow, doubtless some warlike reference to an ancient clan custom.

Knockbreda means the hill above the deep-cut glen, and Knockbreckan means the spotted hill, referring doubtless to the gorse or boulders which originally covered the district. Carnaleigh is carrig a rock, laith, grey—the grey rock which was surmounted by a fort. The Grey point is practically the same name. Craigavad is the rock of the boat, meaning a suitable place of anchorage. The little corner strand adjacent, but nearer Belfast, is Cultra,—Coole, a corner, and tra, a strand. The Kinnegar, at Holywood, was a rabbit warren, as its name denotes—cuini, a rabbit, and cear, offspring.

Ballynafoy, or feigh, is the place of the field games. Opposite an ancient Irish residence there was usually a green plot for games and exercises of various kinds. This was called the

faithche (faha). In the battle of Moyrath we find that a visitor reached Ailech, and was met by the king with a great concourse of the men of Erin upon the faithche. Strange to say, in this instance, history has repeated itself in a literal manner, for our people's playground, known as Ormeau Park, is on a faithche (faha)—Baile-na-faithche.

Malone means the plain of the lambs, and the Clowney Bridge on the Falls was simply the way to the meadows, the bog meadows. Cluain means a meadow. The Falls Road still preserves the old name, fals, meaning hedges or enclosures. In the *Inquisitiones Ultoniæ*, taken at Belfast in eighteenth year of James I., it is called Toughfall, the district of the hedges or enclosures. Its neighbour, the Shankill, has a more ecclesiastical name, Shan, old or grey, and cill, a church, which formerly stood in the old burial ground, and was the original parish church of Belfast, and from it the parish takes its name.

There is a hill above Carrickfergus called Bryantang, meaning the fairy fort at the tongue, and to this day at the meeting of two waters there is a fine fort ; but whether the deni shee still dance ring-a-roses round its charmed circle, I am not able to state. Beyond Bryantang there is a hill called Slieve-a-true, or the hill of the three persons. There is a fine carn on this mountain, which may be the grave of this "dauntless three." There is a pool in our lough called Garmoyle, gearr meaning small, and Moyle being the name of the water between Ireland and Scotland, the sea stream of Moyle about which Moore sings—"Silent, O Moyle, be the roar of thy waters."

Edenderry was formerly a hill of oaks, and the adjoining townland of Ballygomartin was the place of the blacksmiths, who doubtless took advantage of the oaks to fire their smithies. The next townland, Ballydownfine, in which is the City Cemetery, means the place of the white fort, and in it still remains the very large one known as Callender's Fort. Close by is Drumacloghan, or the ridge of the stone castle. The model farm is situated in Ballygammon, meaning the village of the calves. Finaghy, or Ballyfinaghy, as it was called, means the white exercising field.

Colin Glen is in the townland of Poleglass, the green hollow, an apt description, whilst near to this there is Aughrim, or the horse hill, and beyond is Mullaghlass, or the green summit. Above Hannahstown is Slievenagravery, or the gray mountain field, and beyond it is Slievenacloy, the hill of the rampart, upon which there is a monument called Sibs stone.

Close to the Antrim Road before you reach the Castle is the townland bearing the name Ballyaghagan, which may mean the place of the poor fields, or, perhaps, refers to Eochaidh, a progenitor of Madadhan, whilst along the hills above it is Ballysillan, or the place of the wild cherries.

One of the most wonderful and interesting sights in our neighbourhood is the Giant's Ring, which is situated at Ballylesson—this may be Bally lis Owen, the place of the fort or lis of Owen. Can this refer to the great circle with the cromleac, or to the fort on the neighbouring eminence? If so, it may throw some light upon entirely forgotten history.

Ballyrecoolgalgie was an old name for the centre of Belfast, and it has been a puzzle for a long time. I can express no opinion upon it, but I will give you what the authorities state. Strange to say the late Bishop Reeves, who was *the* authority on these matters, passes it over. Robert MacAdam thinks it means Bally, the town ; re, at ; cool, back of ; galge, a gallows ; and this is supported by James O'Neill, M.A. P. J. O'Shea thinks it means the town with the back or support of champions, considering galgie as representing galgad valiant. Dr. Joyce, the editor of Irish names of places, in a letter to Lavens M. Ewart, M.R.I.A, states, " If any man in the world could make out the meaning of Ballyrecoolgalgie, Dr. Reeves was that man ; and you may be sure he would not have passed it by if he had been able to interpret it. I will give you a guess, but remember it is only a guess, had I known the meaning with certainty I would gladly have put it into my book. I think there can be no doubt of the meaning of three of the four elements of which it is composed, Bally-re-coole-Galgie. Bally we all know is a townland ; Coole is either a back or a corner, pretty certainly

cuil a corner (as in Coleraine) ; Galgie is same as Calgie, the genitive of Calgach, a well known ancient Irish personal name. All this is plain sailing, but now comes the guess : What is re ? I think it likely to be the corrupt anglicised form of rath, a fort—Bally-re-coole-Galgie, the town of the fort of Calgach's corner."

In conclusion, I need only add that I have but touched on the fringe of the subject. The field is a wide one, and nothing could afford a student of local history more pleasure than the elucidation of the ancient names of our district.

M. Griffin, Member, followed with an interesting Irish tale.

Miss Alice L. Milligan then read a ballad adapted from the Irish by herself, and entitled "A Lament for O'Cathan," of which the following is a part.

THE LAMENT OF FEARGAL OG.

I am Feargal Og, the poet's son, and I tune my harp to tell
Of the fatal fight by Patrick's Dun where the King of Ireland fell ;
The last of the lords of the race of Niel, and battling for his right,
The noblest chiefs of the Northern land by the Saxon sworder's might,
And friends in crowds and a brother dear are dead with the royal one,
But my dirge is not for the fallen king nor yet for my father's son,
A dearer than any brother born with Brian O'Neill was slain,
And my harp wails slow to a song of woe for Amarc O'Cahan.

For love,
Of my lord and friend O'Cahan.

Gone are the days of our joyous plays, when in childhood's warlike sport
We hailed him chief and enthroned him high on the seat at a mimic fort ;
And gone are the years, when my clamouring tears, could call him to my side,
To raise me up on his shoulders strong, where dearly I loved to ride ;
And I was a king on a hunter bold and he was my charger tall,
To leap and prance at the clarion note or my ringing battle call ;
But no king of old ever grasped the gold of a brighter glittering rein,
Than the child who held by the glorious locks of thy boyish curls, O'Cahan.

Dear curls !
Are they dimmed by the slaughter stain.

Would I might dream, my lord, my friend, that since thou hast not been found,
 Some fairy maid has borne thee far from the reddened slaughter ground ;
 As young Dunlaing was kept, men say, by a glad immortal's side,
 On Cluaintarav's fatal day, when southern Brian died.
 Ah, no ! there was never a fairy spell could hold thee in its thrall !
 Thou wouldst rouse at the Northern rallying cry and rise at the battle-call.
 Thou wouldst leap from the arms of thy dearest love and burst from the magic
 To take thy stand with sword in hand, by the side of Ireland's king. [ring

And so,
 Thou art dead with thy lord the King !

Oh, dear dark eyes of my childhood's friend, must I change from young to old,
 Must I dare the length of cheerless days and not your glance behold ;
 Then life fly past and death come fast and the flames of purging fire
 Shall warm my heart with the gladdening thought of a nearly won desire,
 And when I come to the heavenly place, as I hope to win me there
 By the trust I put in redeeming grace and penitence and prayer.
 I will fix my eyes in reverent wise on the countenance divine
 Of the Lord of Love and Heaven's Queen above, and then I shall look for thine
 Yes, first in heaven for thine, [O'Cahan.
 Ere ever another mortal face, my lord, my friend for thine.

E. Morrissey, Member, finished the evening with a prose selection from the "Gaelic Journal."

Wm. Gray, M.R.I.A., said the whole evening reflected credit upon the Club, more especially upon Mr. O'Shea, the able teacher of the Celtic Class, who deserved the greatest praise for his voluntary services in advancing the study of the Irish language. Mr. Gray was well supported by Mr. McGinley in an eloquent and fluent speech delivered in Irish. The President endorsed all that had been said, and the meeting concluded.

ANNUAL MEETING.

The thirty-first Annual Meeting was held in the Museum on the 25th April—the President in the chair.

Francis Joseph Bigger, Secretary, read the report, and Wm. H. Phillips, Treasurer, read the statement of accounts, both of

which appear in the earlier pages of these Proceedings. On the motion of J. J. Andrew, seconded by G. Coulson, they were both adopted.

Wm. Gray, M.R.I.A., then moved that F. W. Lockwood, C.E., be elected President for the coming year, which was seconded by Joseph Wright, F.G.S., it having been first positively stated by Wm. Swanston, F.G.S., that he could not hold office for another year. Wm. Gray, M.R.I.A., and the President-elect referred in suitable terms to the satisfactory way in which Mr. Swanston had discharged his duties during his year of office, and regretted he did not see his way to continue as President for another year.

On the motion of Wm. Gray, seconded by Joseph Wright, Lavens M. Ewart, M.R.I.A., was elected Vice-President. On the motion of the Secretary, seconded by Wm. Gray, Wm. Swanston was re-elected Librarian, and the hope was expressed that his office would not be a sinecure, now that permanent rooms were about to be obtained for the Club where the books could be properly arranged. The Secretary was re-elected on the motion of Dr. J. St. Clair Boyd, seconded by Wm. Gray. The one vacancy on Committee was filled by the election of Wm. Swanston, and the Committee as thus constituted were elected on the motion of W. J. Trelford, seconded by Dr. Boyd.

On the motion of the Secretary, seconded by the ex-President, the best thanks of the Club were given to Mrs. Leslie, Miss Andrews, Miss Wright, and the other ladies who rendered such valuable services during the past season by providing tea to the members previous to the meetings.

The Report of the Geological Committee (which is subjoined) was then submitted by the Secretary of the Section, Miss S. M. Thompson.

A discussion then ensued as to advisability of creating an entrance fee. It appeared to be the opinion of some that such a course was desirable ; but the general feeling of the meeting was against the change, so the matter was allowed to drop.

Some suggestions were then made as to the summer excursions. The following new members were then elected :—M. A. Galvin, David Wilson, Irvine Crail, Miss Kate A. Corley, C. K. Porter, Rev. J. P. R. Breakey, M.A. ; and Thomas Wilson, C.E. An inspection of the collections sent in for the prize competitions brought the meeting to a close.

SECTION AT NEILL'S HILL, COUNTY DOWN.

LENGTH 43 YARDS, HEIGHT 24 FEET.



- A. Coarse gravel and red sand, with clayey layers.
- B. Boulder clay.
- C. Fine red sand, with layers of gravelly clay.
- D. Boulder clay.
- E. Fine red sand.

REPORT OF THE GEOLOGICAL COMMITTEE.

Compiled by SYDNEY M. THOMPSON, *Hon. Sec.*

For some time past the Club having considered it desirable to conduct some investigations into the glacial geology of its district, on receiving a request from Percy F. Kendall, F.G.S., Sec. to the Erratic Blocks Committee of the British Association, for information as to local glacial phenomena, on the 9th of August, 1893, it was decided to appoint a Geological Committee to carry on these inquiries, which was ultimately constituted as follows :—W. Swanston, President ; Miss M. K. Andrews, F. J. Bigger, J. O. Campbell, W. Gray, A. P. Hoskins, S. A. Stewart, P. Stewart, R. J. Welch, and J. Wright, with Miss S. M. Thompson as Hon. Sec.

The plan of operations was adapted from the Handbook published by the Glacialists' Association,* and the definition of an erratic accepted was that adopted by the Association, namely : "A boulder may be considered as an erratic, irrespective of the distance it may have travelled, provided it does not rest over its parent formation." The enquiries being especially concerned with boulders found in glacial deposits and their distribution, it was decided to form a type collection of such stones, and, if necessary, to obtain the assistance of experts in naming them and ascertaining their place of origin. The exact locality of the deposits investigated, the height above the sea, nature of the surrounding landscape, compass direction of the section, its description, and the long axis of included stones, percentages of erratics, and of various kinds of rocks amongst them, were recorded, and measurements of the larger erratics were obtained. Lists of shells and microzoa found were compiled. Photographs and sketches of the sections were also frequently taken.

S. A. Stewart undertook to examine any shells that might be

* "Hints for the Guidance of Observers of Glacial Geology." By P. F. Kendall, F.G.S. To be obtained from the Assistant Secretary of the Glacialists' Association, 19 Seaton Buildings, Water Street, Liverpool. One Shilling.

found, and Joseph Wright to carry on the search for microzoa, A. Percy Hoskins making such chemical or mechanical analyses as might be deemed necessary; whilst Miss Andrews, R. J. Welch, and other members undertook to photograph sections of special interest. The need for more exact knowledge of the rock-fragments found resulted in a request from the Geological Committee for permission to organize a set of geological lectures to be given by Professor Grenville Cole under the auspices of the Club, of which a notice is given at the end of this report. The investigations were commenced upon the 12th of August, and up to the present time nine deposits have been visited, in addition to many observations previously made by individual members. S. A. Stewart and Joseph Wright have kindly granted permission to use the results of their former examinations into the Mollusca and Foraminifera of the boulder clays of the north-east of Ireland, contained in the appendices of the Club's Proceedings. Such lists will be distinguished by an asterisk.

The Committee have to thank Professor Cole for the gift of his book "Aids in Practical Geology," and some MS. notes; Dr. Szabó for his work on "Blowpipe Analysis;" A. R. Dwerghouse, P. F. Kendall, R. Ll. Praeger, and R. J. Welch for books, pamphlets, and MS. notes; P. F. Kendall for the gift of a collection of Scotch and other rocks, and Prof. Cole and A. M'Henry for aid in determining the origin of erratics, and J. Stelfox and H. M'Cleery for arrangements connected with the lectures.

I.—GREENISLAND STATION, NORTHERN COUNTIES RAILWAY.

In the parish of St. Nicholas, Carrickfergus, Co. Antrim, 140 feet above sea level. Boulder clay, 25 feet thick, resting on Trias, exposed in cutting a subway under railway line; situated on low ground below the range of hills encircling Belfast Lough on the N. side, which form the S.E. escarpment of the basaltic plateau of Antrim, the basalt resting upon Upper Chalk and Greensand, Lias and Trias. Unstratified dark red clay containing isolated small deposits of water and abundant boulders of

all sizes, principally derived from adjacent hills, much rounded, striated and polished. To the W. in the same section are beds of stratified sands and gravels, with fragments of *Tellina*, *Astarte*, and *Balanus*. These beds appear to have been deposited against the mass of clay; stones contained much less rounded than in the clay. 21 species of Foraminifera were found in the clay,† and 15 in the stratified sandy beds.

Redeposited fossils found included a Carboniferous coral, *Gryphea incurva*, *Cardinia ovalis*, ammonite, serpula, and other fragments. One well-bored stone (chalk) was found and another more doubtful specimen. Rolled fragments of gypsum were obtained at the junction of the boulder clay and Trias. 300 boulders taken at random from three different depths were all erratics. Several photographs of the cutting were taken.

(N.B.—In the lists of Erratics, measurements are given in inches unless otherwise specified. Boulders less than one foot long not measured unless of special interest. Origin of rock given, with the compass direction of parent formation added. Abbreviations—ang., angular; sub., sub-angular; r., rounded.)

Erratics.—Quartzites, metamorphic district, Co. Antrim, N. by W. Sheared igneous rock, metamorphic, Co. Antrim, N. by W., or Tyrone, W. Granitic rocks, County Antrim or Tyrone, W. Granite, Co. Derry, N.W., Tyrone, W., or Armagh, S.W. Chalk boulders 5 feet long found 10 feet below surface, Co. Antrim. Chalk and flints, Co. Antrim, basalt boulders 4 to 5 feet long similarly situated and many amygdaloidal and other basalts, Co. Antrim. Dolerite, Ulster. Diorite, Ulster. A boulder of Silurian grit, 28 x 22 x 5, sub., polished and deeply scored, found 22ft. 6in. below surface, and several smaller boulders of the same rock. Co. Down, S. (or Scotland, N.E.). Eurite with Riebeckite, Ailsa Craig, N.E.

II.—CASTLE ESPIE.

Parish of Comber, Co. Down, 3 miles from Comber on shore of Strangford Lough, 39 feet above sea level.

† Tables of the Foraminifera, and percentage of various kinds of rocks contained in the various deposits are given at the end in this Report.

Section exposed in unused quarry, formerly worked for limestone and clay for pottery ; on low ground which extends along the Lough. Fine red unstratified sandy clay resting on red Carboniferous limestone (the only outcrop in this immediate neighbourhood). Limestone beautifully polished and scored, but not visible at present, owing to water in the quarry.

* *Astarte sulcata* and *Leda pernula* found and 12 species of Foraminifera. Redeposited fossils, *Gryphea incurva* and *Cardinia ovalis*, Lias of Antrim. Sections of boulder clay further S. contain Carboniferous fossils from Castle Espie. Boulders principally sub. many beautifully marked with delicate parallel striæ. 100 taken at random were all erratics.

Erratics.—Silurian grits and slates, Co. Down. A coarse grit or fine conglomerate, $6 \times 3\frac{3}{4} \times 2\frac{1}{2}$, ang., probably of Llandoverly age, Co. Cavan, Monaghan, or Armagh W. or S.W. Basalt, Co. Antrim, N. Quartz and quartzite (?). Chalk and flints, Co. Antrim, N.

III.—BLOODY BRIDGE, NEWCASTLE.

In the parish of Kilcoo, County Down, on the coast road 3 miles S. of Newcastle. About 100 feet above sea level. Principal section E. and W. A moraine, cut through by the Bloody Bridge and Glen Fofanny rivers, which descend from the Mourne Mountains (from W.), varying in depth from about 12 feet downwards. Typical moraine deposit, principally the débris of granite, resting upon Silurian rocks with rounded granite boulders and sub-angular fragments of Silurian grit. Stratified to a certain degree. No shells nor Foraminifera were obtained. 100 boulders at 3 different points gave 17, 10, and 24 per cent. of erratics.

Erratics.—Granite or granophyre, Mourne district. Felstone with quartz and mica, Co. Down. Granitic rock, Co. Tyrone and Armagh, N.W. and W. Granitic, igneous series N. of Pomeroy, Co. Tyrone, N.N.W. Quartz and quartzite (?) Claystones (?) Schist (sedimentary), Co. Antrim, N. Porphyry, Tertiary, Co. Antrim.

IV.—BALLYORAN QUARRY.

Parish of Dundonald, Co. Down, 200 feet above sea level. Situated among low rolling hills, about a mile-and-a-half from Dundonald station. Disused quarry of red Trias sandstone, overlaid by boulder clay. Section running N.E. by S.W., 210 yards long. Height, 51 feet in centre, of which 34 are boulder clay. Section photographed shows 20 feet of clay; at N.E., clay thins to 10 feet. Sandstone stratified; dips to the N.N.E. at an angle of 11° . The ice appears to have travelled in the same direction, planing off the upturned edges of the strata, fragments of which are abundant in the base of the drift, which is unstratified red sandy clay. Boulders principally sub-angular, many being well smoothed and striated. No shells found, and only one species of Foraminifera. Photographs of the section were obtained. 90 boulders taken were all erratics. Somewhat to the S.W. is an Esker.

Erratics.—Quartzites (?) Porphyritic rocks (?) Silurian grits and slates, Co. Down. Chalks and Flints, Co. Antrim, N. Basalt, Co. Antrim, N. Eurite with Riebeckite, Ailsa Craig, N.E.

V.—CARROWREAGH QUARRY.

A second unused quarry, lying to the N., was visited; boulder clay resting upon Trias sandstone dipping to N.N.E. at an angle of 22° . The clay rests upon the upturned edges of the strata and upon the surface of the uppermost layer. The ground falls away from the quarry to E. and N.N.E. Main section 32 yards long by 30 feet, resting on 6 feet of Trias. A section at right angles, 20 yards long by 36 feet, showed the clay dipping rapidly to S.E. at an angle of 30° . Surface of clay very irregular, overlaid by an irregularly deposited mass of homogeneous fragments of pale, coarse, angular, friable sandstone, intruding in places slightly into the clay. This deposit had in parts layers of finely stratified sand intruding in curved bedding into the clay, which was altered at the top of the bed by a mixture of this paler deposit. A similar deposit is found

overlying the boulder clay in other quarries in the district. It appears to resemble the "glacial talus" described and illustrated by W. G. M'Gee in the vol. of U.S.A. Geol. Survey for 1889 and 1890. No shells nor Foraminifera were obtained. Photographs were taken of both quarries. Out of 90 boulders 68 were erratics.

Erratics.—Quartzite (?) Silurian grits and slates, Co. Down. Flints, Co. Antrim, N. Basalt, Co. Antrim, N.

VI.—BENMORE OR FAIR HEAD.

Parish of Culfeightrin, County Antrim. Basaltic headland over Carboniferous, 500 to 600 feet above sea level.

In addition to many larger boulders of which measurements have not yet been obtained by the Committee, a multitude of erratics, varying from the size of small gravel up to a pound in weight, are scattered over the top of Fair Head, from Lough Doo to Murlough Bay; the Cambrian (or Pre-Cambrian) schists and quartz rocks of Murlough being most abundant. These rocks commence at Murlough, two miles S.E. of the Head, and cover a large extent of country S.E. to Cushendun. On the top of the cliffs over Murlough is a boulder of schist, 5ft. 6in. x 5ft. x 2ft. 6in., resting on basalt.

Erratics.—Quartz. Murlough district, S.E. Eurite, dyke at Tornamoney Point, S.E. Chert, Carb. of district (?) Eurite with Riebeckite, Ailsa Craig, E.

VII.—THE OLD QUARRY, CARNMONEY.

In Carnmoney parish, County Antrim, behind the church and graveyard, 450 feet above sea level, N.W. of the volcanic "neck."

A quarry, 50 feet deep, formerly worked for limestone (Chalk), on the side of Carnmoney hill. Stiff reddish boulder clay, 6 to 10 feet deep, lying on rather rotten basalt, which rests upon the irregularly denuded surface of Chalk, which dips to E. at an angle of 5°, bringing up Greensand at W. end of quarry. Section lies N.N.W. by S.S.E. Clay unstratified, abundance of rounded and sub-angular boulders, long axis E. of N. by W.

of S. ; considerably smoothed and scratched. 17 per cent. were erratics. No shells found, but five species of Foraminifera ; one redeposited fossil, a Belemnite. Photographs obtained of the quarry, which include 60 yards of its length.

Erratics.—Mica schist, metamorphic district of Co. Antrim, N. by W. Quartzite, metamorphic, like pebbles of Lr. Old Red, Cushendun, N. by W. Chert, probably Carb. of Ballycastle, N.N.W. Indurated chalk, chalk and flints, Co. Antrim. Trias marl, Co. Antrim. Laterite, Co. Antrim. Silurian grits, Co. Down, S., or Scotland, N.E. Micaceous sandstone, Co. Down, S. Carboniferous limestone shales, Co. Down, S. Mudstone, Co. Down, S. Dolerite, Ulster. Basic Felstone, Ulster. Eurite with Riebeckite, Ailsa Craig.

VIII.—WOODBURN.

Parish of St. Nicholas, Carrickfergus, Co. Antrim. More than a mile N W. from Carrickfergus, 166 feet above sea level. Below the range of hill encircling the Lough. Boulder clay exposed in banks of Woodburn river ; base not visible, but probably resting on Trias, as fragments of bright red are seen towards the visible base of cutting. Depth exposed measured at Duncrue Scutch Mill was 13 feet 8 inches. The present course of the river has cut through an older wider river bed with gravel deposit, whose banks were also formed of boulder clay. General course of the river N. by W. Clay tough, dark red, unstratified, with abundant boulders. Long axis a little W. of N. and S. of E., striated, smoothed, and rather rounded. Redeposited fragmentary Greensand fossils found. Shells—**Mytilus edulis*, *Nucula nucleus*, *Leda pygmea*, almost invariably perfect ; *Leda minuta*, almost invariably perfect ; *Leda pernula*, *Astarte sulcata*, *Astarte compressa*, *Saxicava rugosa*, var. *arctica*, *Trophon latericeus*. 50 species of Foraminifera were formerly found, but the bed below Woodburn Bridge, formerly so rich in relics of marine life, is now covered with grass and rubbish. If the Trias be accepted as the underlying rock, all the boulders counted were erratics.

Erratics.—Sericite schist, metamorphic sedimentary, Co.

Antrim, N. by W., or Derry, N.W. Porphyry, intrusive in metamorphic series, Cushendun, Co. Antrim, N. by W. Granite, N. of Pomeroy, Co. Tyrone, W., or Derry N.W. Chalk and flints, Co. Antrim, N.W. Greensand, Co. Antrim, N.W. Basalt and amygdaloidal basalt, Co. Antrim, N.W. Quartz (?).

IX.—NEILL'S HILL.

Dundonald parish, Co. Down. About 100 feet above sea level. A hill about four acres in extent, resting on Trias. Situated at Neill's Hill station, on County Down Railway, among low rolling hills, in a broad valley. Quarried for nearly twenty years for sand and gravel. Surrounding hills of sand and gravel, Neill's Hill alone having beds of boulder clay alternating with current-bedded sands and gravels, capped by a bed of very coarse gravel; towards S.W., brick clay with boulders takes the place of this upper gravel. The principal section runs E. of S. and W. of N. 43 yards long by 24 feet deep at highest point, ground falling away on every side, consisting (in descending order) of the following beds:—

(A) Coarse gravel with dark red sandy and clay layers; bedding very irregular. Many blocks of New Red Sandstone near the top. Bed 4 feet 2 inches thick towards N., increasing to 10 feet towards S., resting unconformably upon boulder clay. Stones rounded and waterworn. Striated stones very scarce. One large fragment of *Astarte borealis* found. Photographs of the section were taken. No Foraminifera were found.

(B) Hard compact fine dark red boulder clay, becoming blacker towards base of bed, resting unconformably upon red sand. Intercalated deposits of gravel from A in upper portion. 3 feet 6 inches thick at S., where it dips at an angle of 14° , and is lost under sand; lost under A to N. Shells (fragmentary) rather rare, including—*Leda pernula*, *Tellina balthica*, *Balanus tulipa-alba*, *Buccinum undatum*, *Astarte sulcata*, *A. borealis*, *Macra subtruncata*, *Trochus (cinerarius?)*, and 14 species of Foraminifera. Boulders striated and polished. Long axis E. and W. to S.E. and N.W. In 100 boulders, all were erratics.

(C) Fine bright red sand, very irregularly current-bedded with intercalated layers of gravelly earth. 8 feet thick at N. and 4 feet 6 inches at S. end, resting unconformably upon boulder clay, and dipping towards S. No shells and no Foraminifera.

(D) Boulder clay 5 feet 6 inches thick, dipping to N. by E. at an angle of 24° . Extending southwards, becomes horizontal, resting upon an apparently old surface of sand. Shells more plentiful than in B, including—*Leda pernula*, *Tellina balthica*, *Balanus tulipa-alba*; and 13 species of Foraminifera. Boulders striated and polished. Long axis N.E. and S.W. 97 per cent. were erratics.

(E) Fine red sand, like C. Base not visible. Greatest depth exposed 4 feet, dipping to N. and S. No shells, and only 2 species of Foraminifera.

This section is unlike anything else in the immediate vicinity, the north-eastern half containing much boulder clay, which extends N. of the railway line for some hundreds of yards. Circular pellets of the clay with stones varying from 14 to 30 inches in diameter and more lenticular masses of gravel are frequently found in the pure sand, which forms the south-easterly half of the hill, attaining a depth of 35 feet. About 20 feet below the surface over half of this sandy area, imbedded in the sand, was a layer of calcareous sandstone about an inch in thickness dipping eastward. A cutting driven across the hill encountered a mass of boulder clay, containing a pit of sand 60 feet wide and 12 feet deep. Much sand is exported for moulding.

A similar deposit of alternate layers of sand and boulder clay occurs near Dundonald station, and thin isolated layers of clay are not uncommon in sand-pits in Co. Down. Where the boulder clay occurs, pits of sand about 12 feet in diameter are not uncommon.

The brick-clay bed at the opposite angle from the main section described is dark, tough, brownish clay. Boulders scarcer and smaller than in the beds already described, 86 per

cent. being basalt, frequently rotten, as compared with 42 per cent. in B. and D. No shells were found, but the bed yielded 2 species of Foraminifera. A redeposited Belemnite from the chalk of Antrim was found.

Erratics.—Silurian grits and slates, vein quartz, grits with veins of a carb. and oxide of iron, Tertiary dykes, and granite or granophyre, Mourne district, Co. Down. Sheared igneous rocks from metamorphic of Co. Antrim, N.W., or Tyrone, W. Mica schist, metamorphic of Co. Antrim, N.W. Quartzites (one with amethyst) metamorphic of Co. Antrim, N.W., Derry, N.W., or Tyrone, W. Chalk, polished and considerably r., 33 x 27 x 15 and smaller fragments, Co. Antrim, N.W. Basalt scored, smoothed, sub., 33 x 21 x 12, ditto 32 x 22 x 15, ditto 20 x 10 x 13 and smaller fragments, Co. Antrim, N.W. Eurite with Riebeckite, from $7\frac{1}{2}$ x 5 x $3\frac{1}{2}$, sub., down to an inch, Ailsa Craig, N.E.

LARGE ERRATIC BOULDERS.

Photographs, measurements, or calculations as to weight of many large isolated erratics have been contributed by R. J. Welch.

1. The "Rocking Stone," Brown's Bay, near Larne. Boulder of basalt with characteristic rudely spheroidal structure, developed by weathering, perched on the edge of a rocky ledge, many feet above sea level.

2. Cloughmore, Rostrevor, Co. Down, Mourne granite, resting on Lower Silurian slate 970 feet above sea level.

3. The "Butterlump," basalt, weighing over 133 tons, 20 x 15 x 15 feet, resting on New Red Sandstone on the shore of Strangford Lough, Co. Down.

4. An erratic of basalt, weighing over 500 tons, resting on Lower Silurian slates on the shore of Strangford Lough, near Greyabbey, Co. Down.

5. An erratic of basalt, the Capstone of Ballymascanlan Cromleac, Dundalk, Co. Louth, 10 ft. 4 in. x 4 ft. 6 in. x 2 ft., weighing 46 tons.

Table showing the Distribution of the Foraminifera in the Boulder Clay Deposits.

Compiled by JOSEPH WRIGHT, F.G.S.

An asterisk distinguishes the deposits previously examined by him and included in his paper in the Club's Proceeding for 1879-80.

ABBREVIATIONS:—*vr*, very rare; *r*, rare; *f*, frequent; *c*, common; *vc*, very common.

LIST OF SPECIES.	Greenland Station.		*			*	Neill's Hill.	
	Boulder Clay.	Sandy Beds.					Sandy Beds	Boulder Clay.
<i>Biloculina ringens</i> (Lamk), ..	..	..	r	..	..	vc	..	..
<i>elongata</i> , d'Orb., ..	..	..	..	..	..	r	..	..
<i>depressa</i> , d'Orb., ..	..	..	..	..	..	vt	..	..
<i>Miliolina tricarinata</i> , d'Orb., ..	..	..	..	..	..	c	..	..
<i>oblonga</i> (Montagu), ..	..	..	..	..	..	c	..	..
<i>seminulum</i> (Linn.), ..	..	..	..	..	r	r	..	vt
<i>subrotunda</i> (Montagu), ..	r	..	..	..	..	vc	..	vt
<i>bicornis</i> (W. & J.), ..	..	..	..	..	..	r	..	..
<i>Cornuspira involvens</i> (Rss.), ..	..	..	..	..	..	r	..	..
<i>Haplophragmium canariense</i> (d'Orb.),	r	..	..	..	..	vt	..	..
<i>Textularia sagittula</i> , DeFrance,	..	..	..	..	..	vt	..	..
<i>Verneuilina polystropha</i> (Rss.), ..	f	..	..	..	..	..	..	..
<i>Bulimina pupoides</i> , d'Orb., ..	vt	..	..	..	vt	r	..	..
<i>marginata</i> , d'Orb., ..	..	..	..	..	..	r	..	..
<i>fusiformis</i> , Will., ..	..	..	..	..	..	vt	..	..
<i>Virgulina schreibersiana</i> , Czjzek,	..	..	..	..	..	vt	..	..
<i>Bolivina lævigata</i> (Will.), ..	..	..	r	..	..	r	..	..
<i>punctata</i> , d'Orb., ..	vt	vt	..	..	..	..	..	..
<i>plicata</i> , d'Orb., ..	vt	vt	..	..	..	vt	..	r
<i>dilatata</i> , Rss., ..	vt	..	..	vt	..	..	..	..
<i>difformis</i> (Will.), ..	..	..	..	..	..	..	..	vt
<i>Cassidulina lævigata</i> , d'Orb., ..	..	..	..	..	..	vt	..	..
<i>crassa</i> , d'Orb., ..	r	r	r	..	..	vt	..	r
<i>Lagena globosa</i> , Montagu, ..	..	..	..	..	..	vt	..	..
<i>lævis</i> (Montagu), ..	..	..	r	..	..	vt	..	..

TABLE—(Continued).

LIST OF SPECIES.	Greenland Station.		* Castlespie, Boulder Clay.	Dundonald, Boulder Clay.	Carmoney, Boulder Clay.	* Woodburn Glen, Boulder Clay.	Neill's Hill.	
	Boulder Clay.	Sandy Beds.					Sandy Beds.	Boulder Clay.
<i>Lagena gracillima</i> (Seg.),	r	..	..
<i>lineata</i> (Will.),	r	..	vr
<i>striata</i> (d'Orb.),	r	..	..
<i>gracilis</i> , Will.,	vr	..	..
<i>sulcata</i> (W. & J.),	r	..	..
<i>costata</i> (Will.),	r	..	..
<i>williamsoni</i> (Alcock),	vr	..	..	..	vc	..	vr
<i>semistriata</i> , Will.,	vr	..	..
<i>squamosa</i> (Montagu),	r	..	..	r	..	vr
<i>lucida</i> (Will.),	r	f	..	..	c	..	..
<i>marginata</i> (W. & J.),	vr	..	..	..	..	..
<i>orbignyana</i> (Seg.),	vr	c	..	c	..	vr
<i>Vaginulina legumen</i> (Linn.),	vr	..	..
<i>Cristellaria rotulata</i> (Lamk.),	vr	..	..	..	..	..
<i>Polymorphina lactea</i> (W. & J.),	vc	..	..
<i>gibba</i> (d'Orb.),	vr	..	..
<i>compressa</i> , d'Orb.,	c	..	r	..	..
<i>lanceolata</i> , Rss.,	r	..	..
<i>Uvigerina angulosa</i> , Will.,	vr	..	..	..	r	..	vr
<i>Globigerina bulloides</i> , d'Orb.,	r	vr	c	..	vr	r	..
<i>Patellina corrugata</i> , Will.,	vr	..	..
<i>Discorbina globularis</i> (d'Orb.),	r	..	..
<i>nitida</i> (Will.),	vr	..	..	..	..	..
<i>wrightii</i> , Brady,	r
<i>Planorbulina mediterraneensis</i> , d'Orb.,	vr	..	..
<i>Truncatulina lobatula</i> (W. & J.),	c	..	..	vr	vr	..	vr
<i>Pulvinulina Karsteni</i> (Rss.),	vr
<i>Rotalia beccarii</i> (Linn.),	r	..	r	..	r	..	r
<i>Nonionina depressula</i> (W. & J.),	r	f	vc	..	vc	r	vc
<i>scapha</i> (F. & M.),	vr	..	..
<i>Polystomella crispa</i> (Linn.),	r	vr	..	..	c	..	vr
<i>striato-punctata</i> (F. & M.),	vc	r	..	vr	c	r	vc

Whilst this paper was passing through the press a specimen of *Discoobina bertheloti* (d'Orb.) was found in the Boulder Clay, Neill's Hill.

LECTURES ON GEOLOGY.

The introductory lecture of the remarkably original and successful course whose syllabus is given herewith, was delivered on the 13th of January, 1894 ; notices of it and the final lecture are given below. The lectures dealt mainly with matters that could be observed in the country around Belfast, and each lecture was followed by practical work, dealing with some of the methods by which rocks may be determined.

1. Hardness ; specific gravity ; simple chemical tests.
2. Pulverisation of the rock ; examination of its constituents ; sifting ; use of polarised light in this method.
3. Brief survey of the use of microscopic sections in studying the structure of a rock.
4. Examination of special types of rocks, igneous and sedimentary, by various methods.
5. Detection of shells, etc., in sands and clays, with a view to determining the origin of such deposits.
6. Tracing the origin of materials that have been removed to a distance from their parent rock-mass.

THE GEOLOGICAL OBSERVER :
AN INTRODUCTION TO THE STUDY OF THE
EARTH.

By GRENVILLE A. J. COLE, F.G.S., M.R.I.A., Professor of Geology in the Royal College of Science for Ireland, and in Alexandra College, Dublin, author of "Aids in Practical Geology."

1. The Materials of the Earth—The making of Minerals and Rocks.

On Saturday evening, 13th January, the first lecture of the geological course was given in the Museum, under the most

favourable circumstances, the hall being quite filled with an audience interested in the study of geology.

The President briefly introduced the Lecturer.

Professor Grenville Cole proceeded, after a few introductory remarks, to show how, by a series of simple observations, mainly in the open air, the past history of a district may be worked out. This history, preserved in the rocks, is intimately and necessarily connected with human history, and geology can now be no longer ignored by the student of peoples any more than by the student of geography. The earliest observations into the materials of the earth were made by pre-historic men seeking suitable stones for implements; then followed the search for native metals, and the discovery, probably made accidentally around a camp fire, that certain ores were capable of being smelted and of producing metals quite unlike them in appearance. Rocks were also selected for use in building and for ornamental work, as in the early Italian churches; and finally it became felt that, beneath their external differences, there lay some difference in their mode of origin which might be worth inquiring into. It was then seen that rocks were made of distinct minerals, and that sometimes one kind, sometimes several kinds, were associated in the same mass. The Lecturer proceeded to define the terms mineral and rock. Rocks are made of mineral particles, minerals of chemical molecules, molecules of atoms of chemical elements. Only some eleven of the seventy known elements form any important part of the crust of earth. Similarly, the common rock-forming minerals are few, nineteen species being mentioned in the lecture. Minerals crystallise out from solution, from sublimation, or from fusion. Rocks are made from materials once held in solution, from materials laid out by winds or waters (sedimentation), or from fusion, as in the case of lava streams. At the present time the crust of the earth was only known to a depth of about fifteen miles, and this depth had been obtained, not so much by the mining and boring of man, as by the upheavals of the earth's surface, which rendered an

investigation of the greater depths practicable. The lecture, which was attentively listened to, most of those present taking notes, was illustrated by a few experiments and a large number of excellent photographic slides, shown by Robert J. Welch, pictorially representing the different points of the lecture. Professor Cole explained to the audience that the lecture was necessarily of an introductory character, but that the subsequent lectures would deal more definitely with the different features of the rocks of the earth.

The practical work followed the lecture, and lasted about an hour. It included the examination of rock-forming materials, the crystallisation of artificial salts from solution, and the determination of the specific gravity of rocks, such as the basalt of the Giant's Causeway, by means of Walker's Balance.

2. A Volcanic Eruption—Lavas Old and New.
3. The Roots of a Volcano—The Making of Granite.
4. A River Mouth—Sand Banks and Mud Banks, River Shells and Sea Shells.
5. The Shore and the Sea—Wasting and Growing of Land, Raised Sea Beaches.
6. The Open Sea—Shell Banks and Corals, Chalk and Flint.
7. The Building of Mountains—Schist and Gneiss.
8. Lakes and Forests—Rock Salt, Alabaster, Iron Ore and Coal.
9. The Decay of Mountains—River Gravels, Plains and Deserts.
10. Glaciers and Icebergs—Moraines and Boulder-drift.

On Saturday evening, 17th March, the final lecture of the geological course arranged by the Club and delivered by Professor Cole was given in the Museum, in presence of a large audience. In the afternoon an excursion had been held to the quarries at the Cave Hill, when a party of about seventy examined the points of interest then exposed, Professor Cole

clearly and concisely pointing out the different geological features of the basaltic and Cretaceous formations. The weather was particularly fine, which doubtless, coupled with it being the national festival, accounted for so large a party turning out at this early season of the year for field work.

The President presided at the meeting, tea having been first served in the ante-room, as usual, by Mrs. Leslie.

Professor Cole, after a few introductory remarks, said—The oldest rocks forming the floor of the county are well exposed in the North, particularly on the coast from Murlough Bay to Cushendun. They are schists and gneisses, probably older than the Cambrian period. The next deposits are the coarse Devonian conglomerates so remarkably developed at the caves of Cushendun. These were probably deposited on the shore of an old lake. The county then went under water at the opening of the Carboniferous period, but plants were washed down into the sandstone deposits, giving us the coalbeds at Ballycastle. A slide was exhibited showing the probable appearance of the old Carboniferous forests on the adjacent shore. In the Triassic period lakes and continental conditions again prevailed, and the drying up of the lakes gave rise to deposits of gypsum and rock-salt. The sea again flowed over the land, depositing the Rhætic shales of Cave Hill, and the Jurassic period that followed was also at first marine. On the land huge reptiles lived ; others swam in the sea, and reptiles even flew through the air, restorations of these strange Jurassic creatures being shown upon the screen. County Antrim emerged from this Jurassic sea sooner than England did, and remained dry land until the middle of the Cretaceous period. Beds of glauconitic sand and white, chalky limestone then succeeded, formed by the accumulation of minute shells in a pure sea. The Lecturer illustrated the characters of the white limestone by those of modern organic oozes. Again, an upheaval came, and soon the earth movements were followed by the opening of a number of volcanic vents, which poured forth the great basaltic lava flows that form the plateaux of Antrim. At Tardree, however, the

first eruptions produced rhyolite, a lava rich in silica. Illustrations were given of the remarkable volcanic phenomena of Co. Antrim, including the contraction-structure of the cooling lavas to which the features of the Giant's Causeway are due. The dykes of Cave Hill were also discussed. Mammals had now, in Eocene times, taken the place of the huge and less intelligent reptiles ; and later, in Pliocene and Post-Pliocene times, the hippopotamus and the elephant wandered in this country. The glacial phenomena pointed to a recent cold period, probably accompanied by partial submergence beneath the sea ; but man came into the country as the land again rose, and at Larne elevation has gone on to a height of 20 feet since his appearance, flint implements occurring in the raised sea beach at the Curran station. The history of the county shows that vast changes are in every probability still in progress ; but the story of life on the globe gives one every confidence that man and his successors will live on and go forward in new lands, even though Co. Antrim or all Europe ultimately sink again beneath the sea. The lecture, which lasted about an hour and a half, was illustrated by some eighty photographic slides of local features, which were almost entirely the work of R. Welch, who officiated with his usual generosity at the lantern.

After the lecture was delivered, the audience having heartily applauded,

The President said it was a great source of satisfaction to the Club in having successfully carried on such an instructive and interesting course of lectures, and being favoured by such a capital lecturer as Professor Cole. From lecture to lecture the interest and the attendance had increased in a most gratifying way to all concerned, and he felt quite sure that the present success would lead to new courses of lectures being delivered next winter either by Professor Cole or some other equally competent lecturer.

F. W. Lockwood, C.E.; J. J. Phillips, C.E.; Mann Harbison, and Dr. Sheldon having expressed themselves pleased and well satisfied with the whole course,

Professor Cole said he felt his weekly visits to Belfast to be pleasant occasions to him, and he hoped to again visit them in the near future, trusting the many friendships he had formed in Belfast would be lasting and continuing ones. He was always at the service of anyone interested in geology who would either call with him in the College of Science, Dublin, or communicate with him there.

The Committee hope to be able to arrange for another course of lectures from Professor Cole next winter.

METEOROLOGICAL SUMMARY

FOR 1893.



WE have again to thank the Council of Queen's College, Belfast, for granting access to the records kept at that Institution, from which the following summary is compiled.

The station at which the records are made is situated in the Lagan Valley, at an elevation of about sixty feet above mean sea-level. The Belfast Hills, which attain a maximum elevation of 1,567 feet, lie to the west and north, stretching in a N.E. and S.W. line, and passing within three miles of the Observatory. Southward and eastward stretch the low undulating lands of Co. Down. Lough Neagh is situated some 14 miles to the westward. Belfast Lough approaches to within two miles on the N.E., and the open sea lies some 16 miles east of the observing station.

REVIEW OF THE WEATHER FOR 1893.

Meteorological Observations taken at Queen's College, Belfast, at 9 a.m. each day.
Latitude, $54^{\circ} 35' N.$; Longitude, $5^{\circ} 56' W.$

1893.	BAROMETER						SELF-REGISTERING THERMOMETERS										HYGROMETER.		
	70 Feet above Sea Level.—Actual Readings.						in shade, in stand outside window, 21 feet above ground.										Mean of dry Bulb	Mean of wet Bulb	
	Highest of the Month.			Lowest of the Month.			Mean.		Range.	Highest of the Month of the Month.		Lowest of the Month of the Month.	Mean Maximum.	Mean Minimum.	Mean of two preceding.	Monthly Range.			Deg. F.	Deg. F.
Inches.	Att. Ther.	Date	Inches.	Att. Ther.	Date	Inches.	Att. Ther.	Inches		Deg. F.	Date						Deg. F.	Deg. F.	
January..	30.430	40.0	11	29.400	45.0	28	29.685	44.7	1.080	52.0	25	22.0	4	44.9	34.5	37.2	30.0	39.1	36.7
February..	30.134	50.0	4	28.964	45.0	21	29.520	44.9	1.170	52.0	10	26.0	25	47.0	35.6	41.8	26.0	41.2	38.6
March....	30.400	49.8	25	29.180	41.0	1	30.030	47.6	1.220	62.0	26	31.0	22	53.2	37.3	45.2	31.0	45.4	43.0
April.....	30.570	52.0	8	29.820	55.0	29	30.155	52.7	.750	66.0	26	32.0	10	54.8	41.3	48.0	34.0	50.6	47.0
May.....	30.500	57.0	8	29.450	61.0	20	30.042	59.6	1.0.0	70.0	12	40.0	1	60.2	48.8	54.5	30.0	57.0	52.2
June	30.400	62.0	7	29.350	64.0	28	29.980	60.6	1.050	77.0	17	44.0	2	63.2	50.7	59.4	33.0	61.6	58.5
July.....	30.230	65.0	3	29.380	64.0	19	29.870	64.2	.850	75.0	2	48.8	16	69.3	53.2	61.2	26.2	62.2	56.6
August....	30.360	60.0	28	29.170	64.0	21	29.942	63.5	1.190	80.0	16	45.0	7	69.2	53.7	61.4	35.0	63.0	58.2
September	30.270	56.0	11	29.150	55.0	30	29.760	57.2	1.120	72.0	5	40.0	23	63.7	48.2	55.9	32.0	57.0	53.0
October...	30.400	52.0	23	29.000	50.0	4	29.772	50.4	1.400	65.0	16	33.0	30	57.1	42.0	49.5	32.0	51.3	48.5
November	30.500	50.0	9	29.500	52.0	25	30.014	48.3	1.000	57.0	29	29.0	8	49.5	36.9	42.7	28.0	43.2	40.9
December	30.620	48.0	30	28.600	44.0	13	29.763	46.0	2.020	55.0	17	29.0	11	51.8	35.3	43.5	26.0	42.1	40.3
Totals...	364.814	641.8		350.964	640.0		358.533	639.8	13.850	783.0		419.8		688.9	516.5	600.3	363.2	613.7	571.5
Means...	30.401	53.4		29.247	53.3		29.877	53.3	1.154	65.2		35.0		57.4	43.0	50.0	30.3	51.1	47.6

REVIEW OF THE WEATHER FOR 1893.—Continued.

REVIEW OF THE WEATHER FOR 1893.—Continued.

1893.	WIND.										RAINFALL.						
	Direction and Amount of Wind, as indicated by Casella's Self-Recording Anemometer.										Gauge—Diameter of Receiver, 1 in.; height of top above ground, 7 ft. 1 in.; height above sea level, 60 ft.						
	Average Daily Direction.																
	Daily Amount.																
Greatest in one day.										Least in one day.		Mean Daily Am't.	Total Depth.	Greatest fall in one day.	No. of days on which fall more than 1 in.		
N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Var.	Miles.	Date.	Miles.					Date.	Inches.	Inches.	Days
January.....	2	3	3	3	2	2	8	4	3	490	7th	45	3rd	225	2·219	·515	17
February.....	4	2	3	3	1	6	7	—	2	615	10th	75	24th	265	3·213	·688	18
March.....	—	2	2	6	2	4	9	4	2	565	1st	70	19th	227	·917	·215	11
April.....	3	8	3	3	1	2	4	4	2	360	29th	45	3rd	127	1·654	·928	8
May.....	3	4	6	6	3	1	5	2	1	290	7th	45	1st	160	1·189	·216	10
June.....	4	6	3	4	2	2	4	4	1	315	24th	37	5th	146	1·167	·246	10
July.....	3	7	2	2	2	3	5	5	2	330	17th	110	1st	183	2·583	·765	14
August.....	3	—	1	5	3	7	2	8	2	322	17th	50	13th	170	4·131	·868	16
September...	—	2	1	1	2	12	7	4	1	440	22nd	55	3rd	186	1·861	·593	16
October.....	—	—	—	—	4	13	11	2	1	410	24th	43	9th	175	2·178	·368	18
November...	5	6	3	1	—	4	5	4	2	862	17th	75	13th	284	1·599	·628	11
December...	—	1	—	2	7	12	2	3	4	442	7th	35	29th	215	3·215	·496	21
Totals.....	27	41	27	36	29	69	69	44	23	5441		685		2363	25·926		170
Means.....										454		57		197			

R U L E S

OF THE

Belfast Naturalists' Field Club.



I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the objects of the Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of the votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club; and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, and two Secretaries, and ten Members, who form the Committee. Five to form a quorum. No member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collections of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subject mentioned in such written requisition.

XI.

That the Committee may be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its members by such other societies.

The following Rules for the Conducting of the Excursions have been arranged by the Committee.

I.—The Excursion to be open to all Memberrrs ; each one to have the privilege of introducing two friends.

II.—A Chairman to be elected as at ordinary meetings.

III.—One of the Secretaries to act as conductor, or, in the absence of both, a Member to be elected for that purpose.

IV.—No change to be made in the programme, or extra expense incurred, except by the consent of the majority of the Members present.

V.—No fees, gratuities, or other expenses to be paid except through the conductor.

VI.—Every Member or visitor to have the accommodation assigned by the conductor. Where accommodation is limited, consideration will be given to priority of application.

VII.—Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII.—Those who attend an Excursion without previous notice will be liable to extra charge, if extra cost be incurred thereby.

IX.—No intoxicating liquors to be provided at the expense of the Club.



BELFAST NATURALISTS' FIELD CLUB.



THIRTY-SECOND YEAR.



THE Committee offer the following Prizes to be competed for during the Session ending March 31st, 1894:—

I.	Best Herbarium of Flowering Plants, representing not less than 250 species	...	£1	0	0
II.	Best Herbarium of Flowering Plants, representing not less than 150 species	...	0	10	0
III.	Best Collection of Mosses	...	0	10	0
IV.	„ „ Lichens	...	0	10	0
V.	„ „ Seaweeds	...	0	10	0
VI.	„ „ Ferns, Equiseta, and Lycopods	...	0	10	0
VII.	„ „ Tertiary and Post-tertiary Fossils	...	0	10	0
VIII.	„ „ Cretaceous Fossils	...	0	10	0
IX.	„ „ Liassic Fossils	...	0	10	0
X.	„ „ Permian and Carboniferous Fossils	...	0	10	0
XI.	„ „ Older Palæozoic Fossils	...	0	10	0
XII.	„ „ Marine Shells	...	0	10	0
XIII.	„ „ Land and Freshwater Shells	...	0	10	0
XIV.	„ „ Lepidoptera	...	0	10	0
XV.	„ „ Hymenoptera	...	0	10	0
XVI.	„ „ Coleoptera	...	0	10	0

- XVII. Best Collection of Crustacea and Echinoder-
mata £0 10 0
- XVIII. Best Collection of Fungi ; names of species
not necessary. Collectors may send (post
paid, from time to time during the season)
their specimens to Rev. H. W. Lett, M.A.,
T.C.D., Aghaderg Glebe, Loughbrickland,
who will record them to their credit ... 0 10 0
- XIX. Best Collection of Fossil Sponges ... 0 10 0
- XX. Best Collection of 24 Microscopic Slides,
illustrating some special branch of Natural
History 0 10 0
- XXI. Best Collection of 24 Microscopic Slides,
showing general excellence 0 10 0
- XXII. Best Set of 6 Field Sketches appertaining to
Geology, Archæology, or Zoology ... 0 10 0
- XXIII. Best Set of 12 Photographs, illustrative of
Irish Archæology 0 10 0

SPECIAL PRIZES.

- XXIV. The President offers a prize of £1 1s. for the Best
Set of three or more Original Sketches, to be placed
in the Album of the Club. These may be executed
in pen and ink, or water-colour, and must illustrate
one or more ancient monuments somewhere in
Ireland. In determining the relative merits of the
sketches, accuracy in representing the subjects and
their details will have chief place. This Prize is
open to the Members of the Belfast Art Society,
and to the Students of the School of Art.
- XXV. W. Swanston, F.G.S., offers a Prize of 10s. 6d. for Six
Photographs from Nature, illustrative of Geology,
contributed to the Club's Album.

- XXVI. Francis Joseph Bigger, Solicitor, Belfast, offers a Prize of £1 1s. for the Best Set of Twelve Photographs (not less than cabinet size) of Ecclesiastical Structures mentioned in Reeve's *Ecclesiastical Antiquities of Down and Connor*, contributed to the Club's Album. The Set of Photographs taking this Prize cannot be admitted in competition for Prize XXIII.
- XXVII. W. H. Patterson, M.R.I.A., offers a Prize of £1 1s. for the Best Collection of Flowering Plants, species not to exceed 50 in number, and 20 of these at least to be plants of considerable rarity ; to be personally collected in Ulster during the year, to be named, with localities and dates attached. Judges—S. A. Stewart and R. Ll. Praeger, or either.
- XXVIII. The Secretaries of the Ulster Fauna Committee offer a Prize of 10s. for the Best Collection of Bats, Rodents, Insectivora, and Carnivora (names of species not necessary) collected in Ulster during the year. Specimens to be sent in a fresh state to the Museum, Belfast.
- XXIX. Mrs. Smythe of Tobarcooran, Carnmoney, offers a prize of £1 1s for the best collection of Irish names of places, with meanings, in the counties of Down and Antrim, *not* included in Joyce.

CONDITIONS.

No competitor to obtain more than two Prizes in one year.

No competitor to be awarded the same Prize twice within three years.

A member to whom Prize I. has been awarded shall be ineligible to compete for Prize II., unless the plants are additions to those in previous collection.

In every case where three or more persons compete for a Prize, a second one, of half its value, will be awarded if the conditions are otherwise complied with.

All collections to be made personally during the Session in Ireland, except those for Prize XXI., which need not necessarily be Irish, nor competitors' own collecting. The species to be classified according to a recognised system, to be correctly named, and localities stated, and a list to accompany each collection. The Flowering Plants to be collected when in flower, and classified according to the Natural System. The Microscopic Slides to be competitors' own preparation and mounting. The Sketches and Photographs to be competitors' own work, executed during the Session; and those sets for which Prizes are awarded, to become the property of the Club.

No Prizes will be awarded except to such collections as shall, in the opinion of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitor.



NOTICE.

EXCHANGES OF PROCEEDINGS.

Amiens—Société Linnéenne du Nord de la France.

Bulletin, Nos. 235 to 258.

Barrow—Naturalists' Field Club.

Annual Report and Proceedings, Vol. VI. and VIII.

Belfast—Natural History and Philosophical Society.

Report and Proceedings, 1892-93.

Bath—Natural History and Antiquarian Field Club.

Proceedings, Vol. VII., No. 4.

Berwickshire Naturalists' Field Club.

Proceedings, Vol. XVI., No 1.

Brighton and Sussex Natural History and Philosophical Society.

Annual Report, 1893.

Bristol—Naturalists' Society.

Proceedings, Vol. VII. part 2.

Cardiff—Naturalists' Society.

Report and Transactions, Vol. XXIV, Part 2; XXV., Parts 1 and 2.

Cornwall—Royal Institution of.

Journal, Vol. XI., Part 2.

Dublin—Royal Irish Academy.

Proceedings, Vol. II., Nos. 4 and 5; Vol. III., No. 4.

Transactions, Vol. XXX., Parts 5 to 10.

„ Royal Society of Antiquaries of Ireland.

Journal, Vol. IV., Part 1.

Proceedings.

Dumfries and Galloway Natural History and Antiquarian Society.

Transactions and Journal, No. 9.

Eastbourne Natural History Society.

Transactions, Vol. VII., No. 2.

Edinburgh—Botanical Society of.

Transactions and Proceedings, Vol. XIX.

,, Geological Society of.

Transactions, Vol. VI., Part 5.

Frankfort—Helios.

Jahrgang 7, Nos. 1. to 12.

Societatum Litterae.

Jahrgang 7, Nos. 4 to 12 and 8 Nos. 1 to 3.

Glasgow—Philosophical Society of.

Proceedings, Vol. XXIV.

Geological Society of.

Transactions, Vol. IX., Part 2.

Halifax, N.S.—Nova Scotian Institute of Science.

Proceedings and Transactions, Vol. 1., Part 2.

Hamilton (Canada)—Hamilton Association.

Journal and Proceedings, No. IX.

Hertfordshire Natural History Society and Field Club.

Transactions, Vol. VII., Parts 5 and 6.

Liverpool Geological Society.

Proceedings, Vol. VII., Part 1.

London Geologists' Association.

Proceedings, Vol. XIII., Parts 1 to 6.

List of Members.

Manchester—Field Naturalists' and Archaeological Society.

Report and Proceedings, 1892.

,, Microscopical Society.

Transactions and Annual Report, 1892

Penzance Natural History and Antiquarian Society.

Report and Transactions, 1892-93.

Plymouth—Institution.

Annual Report and Transactions, Vol. IX., Part 3.

St. John's, N.B.—Natural History Society of New Brunswick.

Bulletin XI.

Stavanger—Museum.

Aarsberetning, 1892.

Toronto—Canadian Institute.

Transactions, No. 6.

Trinidad—Field Naturalists' Club.

Journal, Vol. I., No. 12.

Victoria—Royal Society of.

Proceedings, Vol. IV., Part 2.

Wiltshire—Archaeological and Natural History Society.

Magazine, Vol. XXVI., Nos. 79 and 80.

Yorkshire—Naturalists' Union.

Transactions, Part 18.

U.S.A.—Boston Society of Natural History.

Proceedings, Vol. XXVI., Part 1.

„ California Academy of Sciences.

Proceedings, Vol. III. Part 2.

Occasional Papers, 3 and 4.

„ Massachusetts Tufts College.

Studies, No. 1.

„ Meridan Scientific Association.

Review, 1892.

„ Salem, Essex Institute.

Bulletin, Vol. 23, Parts 1 to 12.

„ Vol. 24, „

„ Vol. 25, Parts 1 to 3.

„ Wisconsin—Natural History Society of

Occasional Papers, Vol. II.

„ Minnesota—Geological and Natural History Survey.

Annual Report (Twentieth) 1891.

„ New-York—American Museum of Natural History.

Annual Report, 1892.

Bulletin, Vol. V., 1893.

„ „ Academy of Science.

Transactions, Vol. XII.

„ Philadelphia Academy of Sciences.

Proceedings, 1892, Part 3, and 1893, Parts 1 and 2.

U.S.A.—Raleigh, N.C.—Elisha Mitchell Scientific Society.
Journal, Vol. IX., Part 2.

„ Rochester—Academy of Sciences.
Proceedings, Vol. 2.

„ Salem—Smithsonian Institution.
Annual Report, 1891.
Report of U.S. National Museum.

„ St. Louis—Academy of Sciences.
Transactions, Vol. VI., Nos. 2 to 8.

„ Washington—U.S. Geological Survey.
Eleventh Annual Report, Part I., Geology.
„ „ Part II., Irrigation.



BELFAST NATURALISTS' FIELD CLUB

THIRTY-SECOND YEAR, 1894-95.

LIST OF OFFICERS AND MEMBERS.

President :

F. W. LOCKWOOD, C.E.

Vice-President :

LAVENS M. EWART, M.R.I.A.

Treasurer :

W. H. PHILLIPS,
8 CHICHESTER STREET.

Librarian :

WILLIAM SWANSTON, F.G.S.,
QUEEN STREET.

Committee :

JOHN J. ANDREW, L.D.S.

GEORGE DONALDSON.

WILLIAM GRAY, M.R.I.A.

JOHN HAMILTON.

S. A. STEWART, F.B.S.E.

MISS S. M. THOMPSON.

ROBERT WELCH.

JOSEPH WRIGHT, F.G.S.

WM. SWANSTON, F.G.S.

JOHN VINYCOMB, M.R.I.A.

FRANCIS JOSEPH BIGGER, M.R.I.A., *Hon. Secy.*, REA'S BUILDINGS,
BELFAST.

Members.

Any changes in the Addresses of Members should be notified to the Secretary.

Adams, John J., M.D., Ashville,
Antrim

Agnew, A. W., Dunedin, Belfast

Allen, Hugh, 71 York Street

Allworthy, Edward, Mosaphir

Anderson, John, J. P., East Hill-
brook, Holywood

Anderson, Robert, Donegall Place

Andrew, J. J., L D S., Belgravia

Andrews, Miss Mary K. College
Gardens

Acheson, Samuel, E. A., 42 Cromac
Street

Allibon, George, 30 Donegall Place

Aird, M. W., 46 Royal Avenue

Armstrong, Rev. J. E., 22 Belgravia
Avenue

Andrews, Miss, 12 College Gardens

Allen, Joseph, Solicitor, Lisburn

Anderson, John M., Marlborough
Park

Anderson, James F., 22 Ponsonby
Avenue

Barkley, James M., Queen's Square

Barklie, Robert, M.R.I.A., Working
Men's Institute

Barr, James, Beechpark, Windsor
Park

Barr, John, 8 Ava Terrace, Bangor

Batt, Wm., Sorrento, Windsor

Beattie, Rev. A. H., Portglenone,
Co. Antrim

Beck, Miss Emma, Old Lodge Road.

Beggs, D. C., Ballyclare

Begley, George R., 18 Kenbella
Avenue

Best, James, Clarence Place

Bigger, Francis Jos., Ardrie

Bingham, Edward, Ponsonby Av

Blair, E., Elgin Terrace, Limestone
Road

Blair, Mrs., Elgin Terrace, Lime-
stone Road

Boyd, Miss, Beechcroft, Strandtown.

Braddell, Edward, St. Ives, Malone
Road

Brenan, Rev. Samuel Arthur, B.A.,
Knocknacarry, Co. Antrim

Brett, Chas. H. Gretton Villa South.

Bristow, Rev. Canon, St. James'
Parsonage

Brown, John, Shaw's Bridge

Brown, Thomas, 105 Donegall St

Brown, R. N. Monaghan (c/o Wm
McWilliam)

Brown, Wm., 18 Chichester Street

Browne, W. J., M. A., Beechmount,
Strabane

Bulla, Charles, Wellington Park
Terrace

Burnett, John R., Rostellan, Malone
Road

Barnes, Henry, 7 Skipper Street

Bain, Miss Dora, Downshire Road,
Holywood

Boyd, J. St. Clair, M.D., 27 Great
Victoria Street

Bruce, Miss E., "The Farm."

Brownlie, R., 75 Victoria Street

Boyd, Charles, Ormeau Road, Belfast

Blythe, Samuel, 12 South View,

Boyd, Miss Ethel, 43 Victoria Place.

Bell, Robert, Charleville street

Burtchaell, George D., M.A., 7 St.
Stephen's Green, Dublin

Breakey, Rev. I. P. R., M.A., The
Rectory, Armoy, Co. Antrim

Calwell, William., M.D., College
Square North

Campbell, J. O., B.E., B.A., Raven-
hill Road

Carson, J. C., 73 Victoria Street

Carruthers, Nathl., 47 Stranmillis
Road

Carruthers, Miss, Claremont Street.

Carson, Robert, Talbot Street

Carter, W., Chichester Park

Carter, Mrs., Chichester Park

Cleland, James A., Wellington Park.

Coates, S. B., M.D., Shaftesbury
Square

Colbeck, James, Shaw's Bridge

Collins, A. J., 3 Windsor Crescent.

Connell, Rev. J., B.A., Holywood

Corry, W. F. C. S., Chatsworth,
Malone Road

Coulson, Gerald, College St. South.

Coulson, J. P., Somerset Terrace

Coulter, George B., 21 University Square
 Coulter, Mrs., 21 University Sq
 Crawford F. H., 20 Mill Street, Belfast
 Creeth, James, Victoria Street
 Crozier, David, 65 Ann Street
 Culbert, Robert, Distillery Street
 Cunningham, Samuel, Glencairn
 Curley, Francis, Dunedin, Antrim Road
 Curley, Mrs., Dunedin, Antrim Rd.
 Carse, Hamilton, Kensington Villa, Knock
 Clements, W. T., Agincourt Terrace, Rugby Road
 Coates, J. Dunville, 41 Chichester Street
 Cooper, Rev. Ed. B.D., Carrowdore Rectory, Donaghadee
 Costigan, Wm., Gt. Victoria Street.
 Cosgrave, Henry, 35 Rugby Road.
 Crawley, Miss A., 67 High Street
 Greeny, Rev. R. N., Edenderry House, Lisburn
 Crymble, George G., Gordon House, Annadale
 Cowan, P. C., C.E., 9 College Gardens
 Coleman, J., H. M. Customs, Southampton
 Cleland, W. W., 48 Wellington Pk.
 Coates, W. T., J.P., University Sq, Belfast
 Cross, Miss, 7 India Street,
 Coulson, Miss, 4 College St. Sonth.
 Cleaver, John Martin, Dunraven, Malone Road
 Carson, John, Walmer Terrace, Holywood
 Coghlan, James, 132 Fitzroy Av
 Coade, Rev. Charles, M.A., LL.D., Methodist College
 Cunningham, Charles M., 79 Great Victoria Street
 Cochrane, Robert, M.R.I.A., 7 St. Stephen's Green, Dublin
 Coyle, Rev. R. I., 3 Kinnaird St
 Crail, Irvine, 2 Glousterville Ter., Fitzroy Avenue
 Corley, Miss Kate A., 52 Elmwood Avenue
 Dufferin and Ava, Marquis of, Clondeboye

Davies, John Henry, Glenmore Cottage, Lisburn
 Davis, Henry, Holywood
 Day, Robert, J.P., M.R.I.A., Cork.
 D'Evelyn, Alexander M., M.D., Ballymena
 Dickson, John M., Hillbrook, Holywood
 Dixon, W. H., Dunowen
 Donaldson, George, 88 North Street.
 Donaldson, John, Dufferin Avenue, Bangor
 Donnan, W. D., M.B., Ardmore Terrace, Holywood
 Duffin, Miss, Strandtown Lodge
 Dunlop, W. J., Bryson Street
 Doherty, James, Queen's College
 Duffin, Adam, LL.D., University Square
 Darbishire, R. D., Victoria Park, Manchester
 Dalton, John P., 4 Roseberry Villas, Chichester Park
 Elliott, David, Albertbridge Road
 Elliott, George, Royal Avenue
 Elliott, George H., Holywood
 Ewart, L. M., J.P., Glenbank House
 Ellison, Rev. Allan, Hillsborough
 Ferguson, G. W., Donegall Park.
 Ferguson, Henry, Donegall Park.
 Ferguson, James H., 2 Wellesley Avenue
 Firth, Joseph, Whiterock
 Firth, Wm. A., Glenview Terrace, Springfield Road
 Flynn, T. M. H., Sunnyside, Bessbrook
 Frame, John, 6 Lawrence Street
 Fullerton, G., Croaghbeg, Bushmills
 Fulton, David, Glenbrook, Cregagh.
 Foster, T. W., M.A., 1 Clonsilla, Antrim Road
 Flashman, E Newbery, 50 Pakenham Place
 Faren, W., Mount Charles
 Galloway, Peter, University Street.
 Galloway, Joseph, 83 Eglantine Avenue
 Gibson, Henry, Glencairn

Gilmore, W. J. Camberwell Villas.
 Glenn, George J. Hartington Street.
 Godwin, William, Queen Street
 Gourley, James, J.P., Derryboy,
 Killyleagh
 Gracey, Robert, Brookhill Avenue.
 Gray, Wm. M.R.I.A., Mountcharles.
 Greenfield, Charles, Marino, Holy-
 wood
 Greer, Mrs., Dulce-Domum, Strand-
 town
 Gulbransen, P. F., 17 Queen's
 Arcade
 Gulbransen, A., 6 Ratcliffe Street
 Gamble, Miss, Royal Terrace
 Graham, William, Lombard Street.
 Green, Mrs. Isaac, Hawthornalem,
 Knock
 Greer, Rev. Geo. S., M.A., Porta-
 ferry
 Gibson, Sergeant, Brown's Square
 Barracks
 Greer, R. T., c/o L. L. Macassey,
 7 Chichester Street
 Gibson, Andrew, 14 Cliftonville
 Avenue
 Grant, Mrs., Palmerston Villa,
 Sydenham
 Grogan, J. G., Spafield, Holywood.
 Gibson, Wm., 30 Castlereagh Place.
 Grimshaw, Miss, Clifton House,
 Cliftonville
 Galvin, M. A., 19 Chichester Street.

 Hamilton, John, 5 Church Avenue,
 Holywood
 Hamilton, Thomas, Queen Street
 Hanford, Ernest, c/o Marcus Ward,
 & Co., City
 Hanna, Richard, Charleville Street.
 Hanna, Wm., B.A., Lisanore Villas,
 Antrim Road
 Hanna, John, Jun., Lisanore Villa,
 Antrim Road
 Harbison, Mann, Ravenhill Terrace.
 Hazlett, Sir James, J.P., Princess
 Gardens
 Hassan, Thomas, Strangemore House
 Heron, F. A., Cultra, Holywood
 Holden, J. S. M.D., Sudbury,
 Suffolk, (Cor. Mem.)
 Hamilton, Alexander, 20 Atlantic
 Avenue
 Hanna, J. A., Engineer's Office,
 Northern Counties Railway

Hardy, Gardner, 5 Wellington Park
 Hill, Robert, Tareen, Chichester
 Park
 Holland, William, Osborne Park
 Hungerford, John, Royal Ulster
 Works, Dublin Road
 Hobson, Benjamin, 6 Hopefield
 Avenue
 Hoskins, A. P., 28 Blenheim
 Terrace, Cromwell Road
 Haveron, R. J., 35 Donegall Place.
 Haddon, Professor, Royal College
 of Science, St. Stephen's Green,
 Dublin
 Hazelton, W. D., 35 Linenhall
 Street, City
 Hamilton, Alexander, 123 Fitzroy
 Avenue
 Harkness, Miss Lizzie, Coil Mara,
 Cultra

 Imrie, James, Rugby Road, Belfast.
 Inglis, Wm., Riverston Terrace,
 Holywood

 Jackson, A. T. 5 Corn Market
 Jefferson, H. S., Rosnakill Strand-
 town
 Johnson, Rev. W. F., M.A., Armagh.
 Johnston, James F., Free Library.
 Johnston, W. J., J.P., Dunesk,
 Stranmillis
 Jones, Professor T. R., F.R.S.,
 10 Uverdale Road, King's Rd.,
 Chelsea, London, N.B
 Jaffé, Mrs. Otto, Kinedar, Strand-
 town
 Johnson, Mrs., Winder Terrace,
 Armagh
 Johnston, James, 19 Waring Street.
 Johnston, Miss, Glouco, Antrim

 Keay, David, 22 College Green,
 Belfast
 Keith, Hutchinson, 7 Glenravel
 Street
 Keith, Samuel J., 7 Glenravel
 Street
 Kelly, W. Redfern, C.E., Dalriada,
 Malone Park
 Kennedy, R. M., 41 Waring Street.
 Kernaghan, Wm., Wellington Park.
 Kidd, George, Lisnatore, Dunmurry.
 Kilpatrick, F., 78 Ann Street.
 Kirkwood, J. A., Dundonald Cottage

Knowles, W. J., M.R.I.A., Ballymena.

Knowles, Miss M., Skelwith Fold, Ambleside, Westmoreland.

Kyle, R. A., 31 Donegall Place.

Knight, Charles G., Gloucester Villa, Antrim Road.

Kennedy, F. J., 4 Clarence Place.

Kinahan, John., Lowood, Belfast.

Lamb, William W., 34 Brookvale Avenue.

Lapworth, Professor Charles, Mason College, Birmingham.

Lawther, Stanley, Mount Vernon.

Lepper, F. R., Elsinore, Crawfordsburn.

Leslie, James, Eglantine Avenue.

Leslie, Mrs., Eglantine Avenue.

Lett, Rev H. W., M.A., Aghaderg Glebe, Loughbrickland, County Down.

Letts, Professor E. A., Dunavon, Craigavad.

Lewers, Hugh, M.D., 257 Shankhill Road.

Lockwood, F. W., Wellington Park Terrace.

Logan, Mrs., Bangor, Co. Down.

Lewis, Joseph, 13 Pakenham Street.

Little, James, 48 Regent Street.

Lowry, D. E., 25 Donegall Place.

Lowrie, Thomas, 1 Fountainville Terrace.

Lamb, Miss, Divis View, Lisburn Road.

Macdonald, Miss, Bantry, Co. Cork.

Macdonald, William, Carlisle Circus.

Mackenzie, John, Malone, Belfast.

Major, Rev. J. J., Belvoir Hall, Belfast.

Malcolmson, Greer, Malone Park.

Malcolmson, Harold, Holywood.

Malcolmson, James, Cairnburn, Strandtown.

Malcolmson, Mrs. Cairnburn, Strandtown.

Mann, Jas. S., Ballyholme, Bangor.

Marsh, Mrs., Glenlyon, Holywood.

Martin, Adam, Knock.

Marsh, Joseph C., Castleton Terrace

Millen, Samuel S., B.A., 44 Ulster-ville Avenue, Belfast.

Milligan, S. F., M.R.I.A., Chelsea, Antrim Road

Mollan, W. S., 15 University Sq.

Mollan, Miss, 15 University Square.

Moore, John, Shaftesbury Square.

Morrow, David, Church Hill, Holywood.

Morton, John, Clifton Park Avenue.

Moss, William, 6 Princeess May Gardens, Antrim Road.

Mull, Henry, 6 Bedford Street.

Murdoch, James, 10 Ponsonby Av.

Murphy, Joseph J., Osborne Park.

Musgrave, J. R., J.P., Drumglass House, Malone Road.

Myles, Rev. E. A., St. Anne's Vestry, Belfast.

Marshall, H. 15 Rockmount, Castle-reagh Place, Mountpottinger.

Maxton, James, 26 Waring Street.

Mitchell, J. S., 47 Magdala Street.

Morrissey, E. J., 14 Lavinia Street.

Munee, W. B., Rosemary Street.

Murdock, Charles, 142 Cullingtree Road.

May, Robert, 40 Lothair Avenue.

Moore, Wm, 5 Ardenvohr Terrace.

Moore, Miss, Corunna House, Ballynakeigh.

Macdowell, Wm. A., 69 Upper Arthur Street.

Mathewson, Mrs., Helen's Bay, Belfast.

Maconachie, Rev. James, Erindale, Cliftonville Avenue.

Murray, P., 95 Fitzroy Avenue.

Morrison, Hugh, Ligoneil, Belfast.

Maerory, Mrs. Eia, Antrim Road.

Montgomery, R. M., 22 Corporation Street

Moore, S. A., 2 Howard Street.

Moore, James, Corunna House, Ravenhill Road.

M'Alister, Thomas, Eglinton Street.

M'Cance, J. S., Dunmurry.

M'Gaw, Miss, 17 Wellington Park Terrace.

M'Chesney, Joseph, Holywood.

M'Clean, F. P., Huntly Villas, Belfast

M'Cleary, H., 82 Clifton Park Avenue, Belfast

M'Clure, Wm. J., Elizabeth Street.

M'Connell, James, Annadale Hall,
 Ballynafeigh.
 M'Connell, Edward, Belmont Park
 Avenue.
 M'Cormick, H. M'Neile, Craigavad.
 M'Cullough, John, Martello Terrace,
 Holywood.
 M'Elheran, W. F., College Gardens.
 M'Ilwaine, John H., Ravensdale,
 Strandtown.
 MacIlwaine, Mrs., Ravensdale,
 Strandtown.
 M'Kee, Robert, M.A., Harlesden
 College, Bramshill Road, Lon-
 don, N.W.
 M'Kee, Miss, Harlesden College,
 Bramshill Road, London, N.W.
 M'Kee, W. S., 20 Mill Street.
 M'Kinney W. F., Ballyvesey,
 Carnmoney.
 M'Kisack, Alfred, Mountcharles.
 M'Dermott, Rev John, Belmont.
 M'Candless, William, 3 Finvoy
 Terrace, Fitzroy Avenue.
 M'Cleery, Wm. H., 22 Landscape
 Terrace
 M'Crea, J. B., Hesseville, Bally-
 nafeigh.
 M'Dade, R. S., 148 Donegall Pass.
 M'Donald, Jas., 37 Donegall Street.
 M'Cullough, J. C., Holywood.
 M'Kee, John, Solicitor, Lombard
 Street.
 M'Kenzie, Dr. W. G., Gt. Victoria
 Street.
 MacLaine, Alexander, J.P., Queen's
 Elms, Belfast.
 M'Lean, George, 8 Pottinger Street.
 M'Leish, John, "The Mount,"
 Mountpottinger.
 M'Mordie, James, Belgravia Avenue
 M'Neill, Miss J., 4 Princess Gardens.
 M'Bain, Alexander, 66 York Street.
 M'Neill, John, 12 May Street.
 M'Kisack, Dr. H. L., College
 Square East.
 M'Gaffin, Miss, Belgravia Avenue,
 Lisburn Road.
 M'Duff, Miss Sarah, 48 South
 Parade.
 M'Cullough, William, Belfast Bank,
 Newtownards.
 M'Cleery, J. O., 82 Cliftonpark
 Avenue.

M'Minn, Charles W., 4 Wilton
 Terrace, the Plains.
 Nelson, Miss, 1a India Street,
 Botanic Avenue.
 Nepveu, Lucien, Courtney Terrace.
 Nesbitt, W. C., Kinnaird Terrace.
 Nicholl, William, Donegall Square
 North
 Nicholson, H. J., 5 West Elmwood.
 O'Neill, Henry, M.D., 6 College
 Square East.
 O'Neill, James, M.A., 5 College
 Square East.
 O'Shea, P. J., South Parade
 Orr, H. Lamont, Garfield Street.
 Owens, John S., St. James Street.
 Patterson, D. C., Clanbrassil Terrace,
 Holywood.
 Patterson, R. L., J.P., Croft House,
 Holywood.
 Patterson, Robt., F.Z.S., Tilecote,
 Malone Park.
 Patterson, R. L., jun., Clanbrassil
 Terrace, Holywood.
 Patterson, W. H., Clanbrassil Ter.,
 Holywood.
 Patterson, Richard, J.P., Kilmore,
 Holywood
 Patterson, Miss Clara, Kilmore,
 Holywood.
 Patterson, William H., M.R.I.A.,
 Garranard, Strandtown.
 Paul, Thomas, Redcot, Knock.
 Phillips, Jas. J., 61 Royal Avenue.
 Phillips, William H., F.R.H.S.,
 Lemonfield, Holywood.
 Pim, John, J.P., Bonavon, Antrim
 Road.
 Pim, John William, 21 Victoria
 Street.
 Pim, Joshua, Slieve-na-Failthe,
 Whiteabbey.
 Pim, Thomas W., 21 Victoria Street.
 Pinion, James, Co. Down Railway.
 Polley, William T., 52 Fitzroy
 Avenue.
 Porter, Miss, 5 Belgravia Terrace,
 Eglantine Avenue.
 Porter, F. A., Queen's Square.
 Porter, Wm., Rate Office, Town
 Hall.

Payne, J. C. C., J.P., Oxford Buildings.

Payne, Mrs., Botanic Avenue.

Peddle, J. F., 9 Donegall Square West.

Porter, Miss Mary, 148 Albion Place.

Praeger, E. A., Holywood.

Praeger, R. L., M.R.I.A., National Library, Kildare Street, Dublin.

Praeger, Miss Rosamond, Marino, Holywood.

Purdon, Mrs., 5 Wellington Place.

Pender, Mrs. M. T., Glengormley.

Pooler, C. K., 159 University Street.

Quail, Rev. Patrick, P.P., Dunmore, Ballynahinch.

Radley, Joseph, Prospect Hill Lisburn.

Rea, Miss, Churchfield, Holywood.

Redmond, David, Saintfield.

Reid, Robert, King Street.

Ridings, Richard, 6 Windsor Terrace

Ringland, S. B., Ballytrim House, Killyleagh.

Robinson, George, Woodview, Holywood.

Robinson, Wm. A., J.P., Culloden, Cultra.

Ross, John, Cliftonville.

Ross, Richard, M.D., Wellington Place.

Ross, Wm. A., Iva-Craig, Craigavad.

Russell, John, C.E., Waring Street.

Reid J. C. W., Montalto, South Parade.

Rew, Fred W., 49 Atlantic Avenue.

Ritchie, James, c/o Millar, Boyd, & Reid, Calendar Street.

Robinson, Samuel, Helen's Bay, Co. Down.

Robertson, W. B., 7 India Street.

Shanks, James, Ballyfounder, Portaferry.

Sheldon, Charles, M.A., Royal Academical Institution.

Skillen, Joseph, Lambeg, Lisburn.

Smith, Rev. W. S., The Manse, Antrim.

Smyth, Walter, Woodview, Holywood.

Smythe, Ven. Archdeacon, Coole, Glebe, Carnmoney.

Speers, Adam, Holywood.

Staples, Sir N. A., Bart., Lissan, Dungannon.

Stelfox, James, C.E., Oakleigh, Ormeau Road.

Stevenson, John, Coolavin, Malone Road.

Stevenson, J. M'N., Carrickfergus.

Stewart, Rev. J. A., M.A., Pond Park, Lisburn.

Stewart, S. A., The Museum, Belfast.

Shaw, Lancelot, Brooklyn, Knock.

Shaw, Mrs., Brooklyn, Knock.

Simms, David, Cromwell Road.

Smythe, Mrs. Proctor, 50 Duncairn Street.

Stacke, Dr. E. C., 78 Pakenham Place.

Steele, David, 36 Ponsonby Avenue.

Steele, R. J., 115 Dunlop's Terrace, Limestone Road.

Stewart, Pakenham, Knockbreda Rectory.

Swanston, Wm., F.G.S., Cliftonville Avenue.

Swanston, Mrs., Cliftonville Avenue

Symington, Saml., Ballyoran House, Dundonald.

Swan, Allan P., Bushmills.

Stirling, James, 14 Rugby Road.

Somerset, Robert, 25 Cavendish Street.

Scott, Henry, 12 May Street.

Steele, Miss, 45 University Street.

Shaw, William Hinde, Brooklyn, Knock.

Stewart, E. M., Knockbreda Rectory, Belfast.

Scott, Conway, C.E., Town Hall, Belfast.

Shannon, James, Kinnegar, Holywood.

Small, Hugh, Sullivan School, Holywood.

Shaw, Cecil, M.D., 14 College Square East.

Symington, Professor, F.R.S.E., Queen's College.

Shaw, Miss, Pine Lodge, Strandtown.

Sharpe, Mr. Robert, 100 Fitzroy Avenue

Stubbs, Maurice, 96 Great Victoria Street

Stears, Samuel, 79 Ormeau Road.

Smyth, Sidney Bryce, M.D., Great Victoria Street

Stewart, Miss, Ulster Hospital, Templemore Avenue

Tate, Alexander, C.E., Longwood, Whitehouse

Tate, Miss A. H., Longwood, Whitehouse

Taylor, E. E., Garfield Chambers

Thomas, S. G., Limestone Road

Todd, John, Clarinda, Fortwilliam Park

Thompson, Miss S. M., Macedon, Whitehouse

Thompson, Mrs. H., Crosshill, Windsor

Thomson, George, Woolton Villa, Rosetta Park

Todd, W. A., 24 Victoria Street

Turner, James, Mountain Bush

Turtle, Jas. C., Claremont, Strand-town

Traill, W. A., Bushmills

Telford W. J., 23 Lincoln Avenue

Thompson, Rev. David, Dromore, Co. Down

Thompson, A., 69 Botanic Avenue, Belfast

Tulloch, Miss, Howard Street

Vinycomb, John, M.R.I.A., Hollywood

Waddell, Rev. C. H., M.A., The Rectory, Saintfield

Wakeman, W. F., F.R.S.A., Knightsville, Blackrock, Dublin

Walker, Thomas, R., Rugby Road

Walkington, T. R., Edenvale, Strand-town

Ward, I. W., Ulster Terrace

Waddell, Miss, 63 Botanic View, University Road

Watson, Thomas, Shipquay Gate, Londonderry

Watson, Wm., Rosslyn, Knock

Watts, Charles W., F.I.C., 40 Goldhurst Terrace, London, N.W.

Waugh, Isaac, Wilmont Terrace, Ardenlee Avenue.

Welch, R. J., 49 Lonsdale Street

White, Benoni, 7 Chichester Street

Whitla, Professor, M.D., College Square North

Wilson, James, C.E., Oldforge, Dunmurry

Wilson, Jas., Ballybundon, Killinchy

Wilson, A. G. Stranmillis

Wilson, W. H., Stranmillis

Wise, B. D., C.E., Waterside, Greenisland

Workman, Rev. R., M.A., Rubane, Glastry

Workman, Thomas, J.P., Craigavad.

Wright, Joseph, F.G.S., Alfred Street

Wright, Miss, Alfred Street

Wylie, William, Mountpleasant

White-Spinner, Mrs., Weldon, Belfast

Whitaker, Miss F., Cliftonville

Walker, Mr., Lawrencetown, Co. Down

Walker, Mrs., Lawrencetown, Co. Down

Wilson, James F. D., 82 Joy Street.

White, John F., Tudor Gardens, Eglantine Avenue

Ward, T., 11 Eden Crescent, Antrim Road

Woollcombe, Dr. Robert Lloyd, LL.D., M.R.I.A., 14 Waterloo Road, Dublin

Wilson, George, 2 Arthur Terrace, Antrim Road

Wheeler, Mrs., Lennoxvale, Belfast.

Walkington, Miss, LL.D., Strand-town

Wilson, David, 3 Ashley Villas, Cliftonville

Wilson, Thomas, C.E., Fleetwood Street

Young, Robert, C.E., J.P. Rath-varna, Chichester Park

ANNUAL REPORT AND PROCEEDINGS

OF THE

BELFAST NATURALISTS' FIELD CLUB

For the Year ending the 31st March, 1895

THIRTY-SECOND YEAR.

SERIES II.

PART II.

VOLUME IV.

1894-5.



Belfast :

PRINTED FOR THE CLUB.

BY ALEXANDER MAYNE & BOYD, : CORPORATION STREET.
PRINTERS TO QUEEN'S COLLEGE, BELFAST.

1895.

REPORT.

The Committee of the Belfast Naturalists' Field Club beg to lay before their members the thirty-second Annual Report. The past year has been eventful in many ways: in its continued increase of members, in the more general interest taken in scientific matters by the public, and also in the general co-operation of the different scientists throughout Ireland with the members of the Club.

At the end of last year the membership stood at 461, and it now stands at the unprecedented number of 516, after allowing for removals by death and other causes. This is by far the highest number ever reached in the history of the Club, and one that causes the Committee grave considerations for the future management.

The Summer Session was of interest and value to the members, on every occasion good weather favoured the Club although the season was generally inclement. What has been the rule for some years past was carried out in June, viz.:—A joint excursion with the Dublin Field Club, which was rendered more interesting by the members of the North Staffordshire Field Club taking part in the day's proceedings. This English Club visited Belfast for the first time and were entertained by our members in the Museum and provided with guides during their week's stay. Our Secretary also prepared their Programme and gave them all the local assistance possible, for which the hearty thanks of the visitors were cheerfully given to our Club.

The following is a list of the summer excursions :—

Murlough	...	...	...	...	19 May.
The Boyne	...	...	...	...	16 June.
Scrabo	...	...	...	...	30 June.

Rosapenna and Port Salon	...	...	11, 12, and 13 July.
Slieve Mis	...	...	11 August.
Dundrum	...	...	25 August.
Langford Lodge	...	...	15 September.

The attendances at these excursions varied from 25 at Ballycastle to 120 at Langford Lodge.

The best thanks of the Club are due to Miss Clarke, for Murlough; George Coffey, M.R.I.A., for the Boyne; Rev. Narcissus Batt, A.M., for Rathmullan; W. J. Knowles, M.R.I.A., for Ballymena; The Marquis of Downshire, for Dundrum; and the Rev. A. H. Pakenham, for Langford Lodge. Also to the different Railway Co.'s for the advantages given and the courtesies extended to the members.

The formation of the Irish Field Club Union, whereby the Field Clubs of Ireland will have a central Committee, will, doubtless, work for the general benefit of all concerned. It is not intended that the individuality of any Club should be sacrificed, but it is contemplated that there should be an annual gathering each summer of all the Clubs and an interchange of lecturers during the winter. As an initiation it is proposed to hold a conference of the Field Clubs next July in Galway, when excursions will be held and papers of general interest brought forward.

The winter meetings were as follows:—

- | | | |
|----------|----|--|
| 20 Nov. | 1. | Presidential Address, by F. W. Lockwood, C.E. |
| | 2. | "Irish Field Clubs and Field Club Work."—R. Lloyd Praeger, M.R.I.A., Member. |
| | 3. | "Note on a Sample of Glauconite from Woodburn, Carrickfergus."—A. Percy Hoskins, F.I.C., F.G.S., Member. |
| 26 Nov. | | "Celtic Language and Literature."—Douglas Hyde, LL.D. |
| 18 Dec. | 1. | "Notes on Moel Tryfaen."—Miss Mary K. Andrews, Member. |
| | 2. | "A Bit of Foreshore."—Miss Sydney M. Thompson, Member. |
| | 3. | "The Missing Beds from Cave Hill."—Wm. Gray, M.R.I.A., Member. |
| | 4. | Report of the Delegates to British Association. |
| 15 Jan. | 1. | "On the Occurrence of Boulder Clay on Divis."—Joseph Wright, F.G.S., Member. |
| | 2. | "Modern Relics of Olden Time."—Prof. A. C. Haddon, M.R.I.A., Member. |
| 19 Feb. | | "Irish Art as Shown on Ancient Crosses."—Rev. Denis Murphy, S.J., LL.D., M.R.I.A. |
| 19 March | 1. | "Additional Lepidoptera of Enniskillen."—Lieutenant-Colonel Partridge. |

2. "Hullite," by Prof. Grenville A. J. Cole, M.R.I.A., Member.
 3. "Wild Bird Protection and Nesting Boxes."—John R. B. Masefield.
 4. Annual Microscopical Meeting.
- 28 March Irish Night by the Celtic Class.
9 April Annual Meeting.

The average attendance at all these meetings was very good. On several occasions the room was crowded, whilst on the Irish night the Museum was found quite inadequate to afford accommodation, so the meeting was held in the Y.M.C.A. Hall.

During the season two most successful courses of lectures were held, given under the auspices of the Club. The first course was geological, "The Story of Life on the Globe," and was delivered by Professor Grenville A. J. Cole, M.R.I.A., of the Royal College of Science, Dublin. This the second course delivered by Professor Cole was much appreciated, and cannot but do good to the students of this science in the Club.

The second course was botanical, being delivered by Professor T. Johnson, D.Sc. of the Royal College of Science, and entitled "The Study of Plant Life." This course will do much to arouse the somewhat lagging interest of the members in this important study. Both courses were followed by practical classes, where much technical information was obtained and general advice afforded.

The Geological Committee, with Miss S. M. Thompson as Secretary, has done good work during the Session (see Report, page 229).

The Microscopical Section has been less active than usual during the year, but with the advent of the Rev. John Andrew as President, and W. Donnan, M.D., as Secretary, more work may be expected during the coming Session. The members of this Section rendered good services to Professors Cole and Johnson during their courses of lectures.

The Celtic Class has done well under the care of its founder, P. J. O'Shea, who was ably assisted by J. St. Clair Boyd, M.D., and George Gibson (see Report, page 227). On the Irish night much interest was aroused in the readings and songs in the native tongue, and especially in the old Irish airs played on the

violin and the harp (see Programme, page 228).

On each evening of meeting tea was provided for the members by Mrs. Lockwood, Mrs. Leslie, Miss Andrew, and the Misses Wright, to whom the Committee wish to return their best thanks for their consideration.

The Club has at length obtained permanent rooms of their own in the rear of the Museum through the kindness of the Natural History Society. This will be found a great advantage to the members, affording a place for the keeping of the valuable collection of books and albums now possessed by the Club, where they can be accessible at all times ; and also a store-house for specimens, and a general meeting place for small classes and committees. At present many small requisites are required in these rooms which will be supplied in due time.

The following are the reports of the judges appointed to examine the collections sent in by the members in competition for prizes :—

Prize 2.—For this prize a series of beautifully-mounted plants has been sent in by Rev. C. H. Waddell, B.D. This collection represents about 180 species of our local plants. It complies in every way with the conditions, and we accordingly adjudge that Prize No. 2 be awarded.

Prize 27.—For this prize two competing series of rare plants have been sent in—No. 1 by Miss M. C. Knowles and No. 2 by Rev. C. H. Waddell, B.D. Both of these collections are excellent, and each includes a good number of plants of considerable rarity, and in each there are plants unknown in the district at the time of the publication of the *Flora of North-East Ireland*. A careful comparison of these two sets has been made, with the result as follows :—No. 1 collection has two plants not included in *Flora N.E.I.* and eight which are marked in the *Flora* as "very rare." No 2 collection also includes two which are not in *Flora* and eight marked "very rare." No. 1 collection has in addition 26 species stated in *Flora* to be "rare," whilst No. 2 collection has 19 species so classed. The Prize No. 27 is therefore awarded to Miss M. C. Knowles.

Your Committee hope that during the coming season the members will continue to extend their practical work, and endeavour to maintain the name of the Club as a society of original research.

The best thanks of the Club are due to the local press for the lengthened reports of the Club's proceedings given in their issues from time to time.

FRANCIS JOSEPH BIGGER,
Hon. Secretary.

THE TREASURER IN ACCOUNT WITH THE BELFAST NATURALISTS' FIELD CLUB.

Dr.

Statement of Income and Expenditure for the Year 1894-95.

Gr.

To Balance ..	..	£0 8 11	By Expenses of Social Meeting ..	..	£21 16 6
" Subscriptions ..	..	111 0 0	" Printing Proceedings ..	..	38 0 0
" Tickets Sold for Conversazione ..	..	6 18 0	" Stationery, Printing, and Advertising ..	..	32 13 6
" Sales of Guido ..	£0 18 0		" Meteorological Report ..	..	1 0 0
" Do. Proceedings ..	0 2 3		" Donation to <i>Irish Naturalist</i> ..	..	2 0 0
" Do. Flora ..	1 11 11		" Expenses of Lectures ..	..	2 18 0
" Do. Lists ..	0 7 6		" Rent of Museum ..	..	11 11 0
" Gain on Excursions, Toas, and Irish Concert ..	2 19 8		" Collector's Commission ..	..	5 18 1
	30 1 7		" Prizes ..	..	2 0 0
			" Postages ..	..	26 1 6
			" Insurance ..	..	1 4 6
			" Incidentals ..	..	0 0 11
			" Balance ..	..	6 4 2
		£151 8 2			£151 8 2

Audited and found correct,

S. A. STEWART.

W. H. PHILLIPS, *Treasurer.*

PROCEEDINGS.

SUMMER PROGRAMME.

EXCURSIONS.

19 *May.*

BENMORE AND MURLOUGH.

The first of the summer excursions was held on Saturday, 19 May, to Benmore and Murlough Bay. An early start was made by the Northern Counties Railway, reaching Ballycastle at 9-30, in time for a comfortable breakfast in the Antrim Arms, where Robert Hunter paid every attention to the members. After breakfast cars were mounted and a start made for Fair Head, past the ruins of the old Franciscan Monastery, at Bonamargy, where lovely views of the head and the sea were obtained. An hour's drive brought the party close to the shores of Loch-na-Crannoge, near the summit of the head, where the vehicles were left and the journey around the headlands pursued on foot. The interesting lake-dwelling was viewed from a distance, but the geologists, who composed the majority of the party, pushed on to the cliffs to see and examine the disintegration that was there taking place, the columns, standing out perpendicularly from the cliffs and toppling over the sea at a height of 600 feet, affording a sight unequalled on all our Antrim coast, especially when a large steamer sailed past close in to shore and apparently within gunshot. The Grey Man's Path was soon reached, and some of the party

descended its dizzy winding, whilst others crossed the fallen column, being skilled climbers, and apparently regardless of its height above the abyss.

At this point W. A. Traill, C.E., of Bushmills, gave a description of the geology of the district, pointing out the different formations as exemplified in the rocks around, thus giving a practical lesson in this science that was much appreciated by all present. Soon the heights above Murlough were reached, and if the members had done or seen nothing else the landscape spread out before them fully repaid them for their visit. A luxuriant growth of trees and underwood extended to the water's edge, where gently curling waves washed around the fantastically shaped limestone rocks, whilst the whole bay was walled in with a great semicircle of ponderous cliffs, forming a scene of wondrous beauty and enjoyment. The pleasing situation was taken advantage of by William Gray, M.R.I.A., who explained the different geological strata visible—the trap, the Chalk, the Greensand, and the New Red Sandstone—and generally imparted as much information as he could in the limited time at his disposal.

The descent to the shore was made through the glen amongst a lavish growth of ferns and primroses, wild hyacinths and wood anemones, whilst here and there the talus of the cliffs appeared in irregular heaps, showing the different formations in confused masses. Miss Clarke, the genial occupant of the cottage on the shore, with true Irish hospitality provided a cup of tea for the members, which was much appreciated amidst the comely surroundings of her home. Some of the *Asplenium maritimum* was here collected, also specimens of the Bree's fern (*Lastrea æmula*), and the sea campion (*Silene maritima*). In the ascent the party was divided, one section going to examine the greensand in the cliffs, the other taking the path to the site of the little church on Drumnakill, the foundations of which are still distinct, and near to which is a rude cross almost buried in the ground. At four o'clock the machines were reached on the summit of the cliff, and the return made to Ballycastle, when

tea was ready in the Antrim Arms. Throughout the day the weather was enjoyable, no rain falling and no excessive heat to render the ascent from Murlough a toil instead of a pleasure. Belfast was reached at nine o'clock.

16 *June.*

DROGHEDA AND THE BOYNE.

A party of nearly one hundred took seats in the seven o'clock train to Drogheda, but a considerable number of these were members of the North Staffordshire Field Club, on a visit to our district, who accepted the invitation of the local Club to join this excursion. The country looked at its best as the train sped through field and wood, past river and mountain, till the high bridge at Drogheda was reached, when all eyes were turned up and down the historic stream that was to be the scene of the day's investigations. A number of the party proceeded to Laytown, there to join the Dublin Naturalists, and work their way along the seashore to Drogheda, whilst a number of the Dubliners joined the Club, preferring the associations of the upper reaches of the river to the collecting ground of the tidal portions.

All was bustle at Drogheda getting the large party duly provided with vehicles, but the proprietor of the White Horse had endless resources apparently at his command, judging by the imposing cavalcade of differently-assorted vehicles that quickly wended their way through the narrow streets of Drogheda.

The road to the Obelisk could not be surpassed for pastoral beauty, along the side of the river, past woods and rich meadows, yellow with waving buttercups—all went to making a scene of pleasing variety and prosperity not excelled in any other part of Ireland. At the foot of King William's Glen the party dismounted and viewed the Obelisk, erected on a rock on the margin of the river to mark the spot where King William

crossed in that struggle of two hundred years ago when the interests of two English kings were decided upon Irish soil ; but now "not a drum was heard" to disturb the quiet ripple of the water passing over the stones once forded by a King on that memorable day in July. The next halt was at the ring fort, or military rath, of Dowth, which is of very large extent and in good preservation, being second only to the Giant's Ring in extent. The machines then pushed on to Newgrange, along roads with broad grass margins, clearly pointing out the country to be a hunting one, and affording plenty of "poor man's land," where the labourer gets free grazing for his beast. At Newgrange, or Brugh-na-Boinne—the city of the Boyne, as it is properly called—George Coffey, M.R.I.A., who had come from Dublin, kindly acted as pioneer and guide. Lamps and magnesium wire were brought into requisition in the large central chamber, whilst the party crept through the fifty-foot entrance passage, at some place on hands and knees or in a stooping posture, guided by the lights from the centre. The curious carvings on the great stone slabs used in the construction of the building were examined, seemingly proving from their position, which was very often not on the outside face, or partly covered, that they may have served a purpose anterior to their present one.

The cairn over the chamber, now covered with grass, is composed of different-sized stones, and is so large as to have quite the appearance of a natural hill. Around its base still remain many of the large standing stones which formed at one time a complete circle. The origin of this mausoleum is lost in antiquity, but it was doubtless the burial-place of the ancient kings of Erin. It is the finest of its class in Western Europe, and to the antiquarian is as interesting in many respects as the pyramids of Egypt. The stones used in the chamber, especially the roof stones, are so large and well built, and the cairn itself is of such an area that the labour of erection must have been something enormous in those early times. The waiting for admission to the interior was taken advantage of by the

remaining members in lunching round the base of the cairn, so that every standing stone had its little group of appetite-appeasing visitors, pleasantly chatting, and conjuring up the spirits of departed Ard-Righs from the mouldering chambers of Brugh-na-Boinne.

In due time the cars were mounted and Dowth reached. Here a somewhat similar chamber, on a much smaller scale, was inspected and the church adjoining visited. Here are the tombs of the Netterville family and the remains of their ancient castle, now a charitable institution. From this church was lately sent to the United States a stone to mark the grave there of a prominent Irish politician. The ancient front is well preserved, whilst built into the southern wall is one of those curious figures known to the archæologist as Sheelah-ny-Giggs. In the adjoining gardens the mulberry and yew trees were admired. The southern bank of the river was taken on the return journey, and after a pleasant drive the Whitworth Hall was reached in time for tea. The Laytown party, including the Dublin Naturalists' Field Club, had already arrived, and were making up their "takes" during the day. The rare shell, *Helix Pisana*, with varieties hitherto unnoticed, was found in abundance feeding on *Euphorbia portlandica* and other plants. This is the only known habitat for this shell in Ireland. *Pupa muscorum* was found under stones on the sandhills, whilst in the shallows of the Boyne *Hydrobia ulvæ* was found in myriads, and so was *Melampus bidentatus*. The botanists got some good plants, including the following:—houndstongue (*Cynoglossum officinale*), mouse-ear (*Cerastium arvense*), moonwort (*Botrychium Lunaria*), henbane (*Hyoscyamus niger*), *Geranium perenne*, gromwell (*Lithospermum officinale*), and fennel (*Fœniculum officinale*), *Festuca uniglumis*, *Artemisia maritima*, *Euphorbia portlandica*, *Euphorbia paralias*, *Eryngium maritimum*, *Apium graveolens*, *Orobanche minor*. The entomologists took in abundance the painted lady (*Cynthia Caroni*), and the small heath (*Hipparchia Davus*). Other were seen, but not captured. After tea

The PRESIDENT (F. W. Lockwood, C.E.), in a few remarks, dealt with the advantages to be derived from these joint excursions and the benefits conferred on those taking part in them by mixing with others from a distance.

G. H. CARPENTER, B.Sc. (President of the Dublin Club), on behalf of his members, also spoke of the advantage of such unions, and congratulated all present on the good day, the antiquarians contending that theirs could not be beaten, whilst the naturalists were surprised that any one could compare the gloomy recesses of Brugh-na-Boinne to the breeze and sunshine of the sand-dunes at Laytown.

Dr. WHEELTON HIND, as President of the North Staffordshire Field Club, expressed the pleasure and profit they had derived from the joint excursion, and thanked the Club for their kindly interest in the strangers.

The following new members were then elected :—W. J. Fennell, M.R.I.A. ; Wm. A. Boyd, Samuel Moore, Samuel Stevens, L. L. Macassey, John Paul, Leonard Bell, C.E. ; Charles Mullin, Solicitor ; Alex. M'I. Clelland, Jas. H. Cousins, John M'Cormick, T.C. ; Mrs. M'Cormick, and Miss A. Milling. On the road to the train St. Lawrence's Gate was examined ; it consists of two circular towers and a connecting curtain wall, being part of the old fortifications of the city. The whole structure is still quite complete, and forms a picturesque termination to the street.

30 *July*.

DUNDONALD AND SCRABO.

A half-day's excursion was held on Saturday afternoon, 30 July, to Dundonald and Scrabo. A party of seventy left the Linen Hall at 2.30 in waggonettes. A halt was called at Dundonald Church to examine the fine mound close to the graveyard, whose height and steepness render it peculiarly interesting to the antiquary. No investigation has yet been

made at this dun, so it is an undecided point whether it was a burial-mound or a primitive place of residence. Close by, on a knoll of rising ground, stood Ballyregan, an ancient castle of the O'Neills, but not a vestige of it now remains, although an underground passage to the adjoining stream is said to be still in existence. Through the thoughtfulness of S. Symington, one of the members, the adjoining meeting-house had been opened, and what is known as the "chest," rescued from the wreck of one of the ships of the Spanish Armada, was shown to the members. This chest is very similar to the two at Glenarm Castle, known to have been saved from the wreck of the *Gerona*, commanded by Alonzo Da Leyva, wrecked at Port na Spania. There is, however, no satisfactory explanation of how it arrived at Dundonald. It is heavily clasped with iron, having side handles and clasps in front for separate locks, whilst the key acts from the centre of the lid, locking numerous bolts which shoot into an iron rim in the body of the chest. Previous to examining the Kempe Stone the party were hospitably entertained at Ballyoran House by the Misses Symington, daughters of one of the oldest members of the Club. This fine cromlech formerly gave the locality its name, Baille-clough-Togal, "The Town of the Stone of the Stranger." It is now called Green-graves, and doubtless marks the last resting-place of some chieftain. If a small space were cleared around this monument and the field stones removed it would be a desirable improvement, and add much to the attractiveness of the district. Ballyoran, the town of the cold spring, now in Dundonald parish, was in 1334 possessed by William De Burgo, and was at the Dissolution appropriate to the Abbey of Inch. A short halt was made at the Glebe Quarries, where there is a fine cutting of boulder clay which proved interesting, its distinctive features being pointed out by William Gray, M.R.I.A., who here and on the Hill of Scrabo did much to explain the different geological formations. The name Scrabo is from the Celtic *scrawbo*, the grassy place of the cows, and on this hill lived Shawn Macananty, the northern fairy king, who held his

court in the interior of the old cairn on the summit. All were charmed with the beautiful views from the summit of Scrabo, the undulating hills of "sweet County Down" and the waters of Strangford Lough, with its three hundred odd islands, all going to make a pleasant scene in the evening sunlight. Many ascended the tower erected to the memory of the Marquis of Londonderry—he who was known as the "fighting Marquis" of Peninsula fame, whilst the thoughts of others wandered over the events in the life of the most celebrated member of the same family, and to some the scathing lines of Byron were called to recollection. The descent from the hill was soon made, and a short drive brought all into tea at the Ulster Hotel, Newtownards, after which a short business meeting was held with Wm. Gray in the chair, when the following new members were elected:—William Ewart, George Scilly, John Pullman, and James T. Oswald. After tea a short time was allowed to visit the old Abbey Church and the Town Cross preparatory to leaving for Belfast.

11 *July.*

PORT SALON AND ROSAPENNA.

On the morning of the 11 July the Northern Counties Railway brought a party of forty into the city of Derry, where a 'bus soon conveyed the party across the city to the station for Fahan, where a special steamer was boarded for Port Salon. Lough Swilly is beautiful and interesting between Fahan and Port Salon, and the sail down the waters past the sandy bays and the rugged heads, caverned by the sea, afforded pleasure and satisfaction to all on board. The rocks at Ballynastocker were pointed out upon which His Majesty's frigate "Saldanha" was lost. This frigate seems to have been particularly ill-fated on this cruise in search of privateers, for in the January of the year she was wrecked, Midshipman Graham and seven seamen were drowned in a small boat while doing King's service. The

Saldanha struck the Swilly Rock, in a storm at night, and was driven from there to Ballynastocker, where she foundered with all her crew. Two of her large guns grace the gates of Colonel Barton at Port Salon, and other of her relics are still in the neighbourhood. The following pathetic account of the incident is by Thomas Sheridan, grandfather of the Marquis of Dufferin and Ava :—

Rathmullan, 6 December, 1811.—“ His Majesty’s ship ‘ Saldanha,’ one of our finest frigates, commanded by Captain the Hon. W. Pakenham, brother to the Earl of Longford, sailed from Cork on the 19 of November, to relieve His Majesty’s ship ‘ Endymion ’ off Lough Swilly, Having reached the harbour, she again sailed on the 30 with the intention of proceeding to the westward. On the evening of the 4 of December it blew the most dreadful hurricane. At about 10 o’clock at night, through the darkness and the storm, a light was seen from the signal-towers, supposed to be on board the ‘ Saldanha ’ passing rapidly up the harbour. When the daylight appeared the ship was discovered to be a complete wreck in Ballynastocker Bay. Every one of the 300 souls on board had perished, and all the circumstances of her calamitous loss had thus perished with her. The bodies of Captain Pakenham and about 200 of the crew are said to have been washed ashore and were interred in a neighbouring burying ground.”

“ Britannia rules the waves ”—

Heard’st thou that dreadful roar ?
Hark ! ’tis bellowed from the caves
Where Lough Swilly’s billow raves,
And three hundred British graves
Taint the shore.

No voice of life was there—
’Tis the dead who raise that cry—
The dead— who heard no prayer
As they sank in wild despair,
Chant in scorn that boastful air
Where they lie.

“Rule Britannia” sung the crew,
 When the stout Saldanha sailed,
 And her colours as they flew,
 Flung the warrior cross to view
 Which in battle to subdue
 Ne’er had failed.

Bright rose the laughing morn,
 (That morn which sealed their doom,)
 Dark and sad is her return,
 And the storm-lights faintly burn
 As they toss upon her stern
 ’Mid the gloom.

From the lonely beacon’s height
 As the watchmen gazed around,
 They saw that flashing light
 Drive swift athwart the night,
 Yet the wind was fair and right
 For the Sound.

But no mortal power shall now
 That crew and vessel save—
 They are shrouded as they go
 In a hurricane of snow,
 And the track beneath her prow
 Is their grave.

There are spirits of the deep
 Who, when the warrant’s given,
 Rise raging from their sleep
 On rock or mountain steep
 Or ’mid thunder-clouds that keep
 The wrath of Heaven.

High the eddying mists are whirl’d
 As they rear their giant forms,
 See ! their tempest flag’s unfurl’d,
 Fierce they sweep the prostrate world,
 And the withering lightning’s hurl’d
 Thro’ the storms.

O’er Swilly’s rocks they soar,
 Commissioned watch to keep :
 Down, down with thund’ring roar,
 The exulting demons pour ;—
 The Saldanha floats no more
 On the deep !

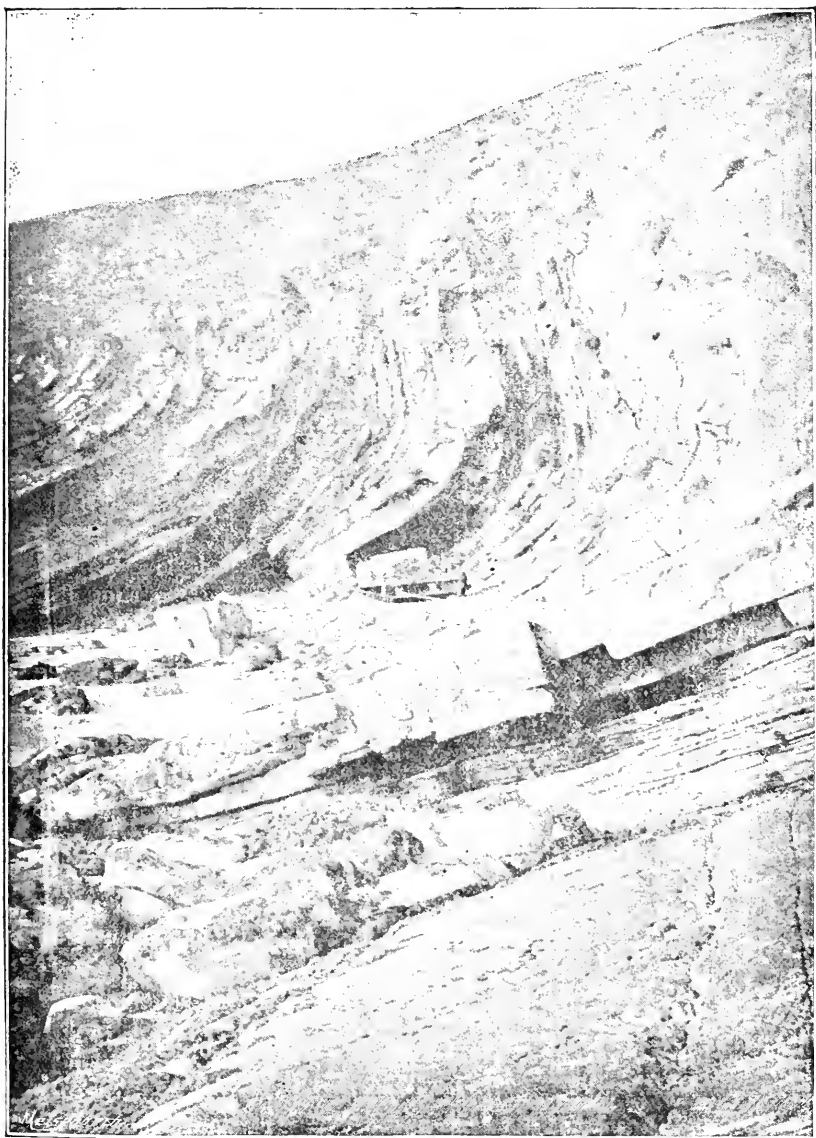
" Britannia rules the wave ! "
Oh ! vain and impious boast ;
Go, mark ! presumptuous slaves,
Where He who sinks or saves,
Scars the sands with countless graves
Round your coast.

The little harbour at Port Salon, at the foot of the hotel lawn, was reached at two o'clock, and no time was lost in getting into this comfortable home, where Miss Barton soon made all feel happy and contented. After an early dinner, the different points of interest were mentioned by the Rev. A. H. Delap, the local rector, who kindly placed himself as guide at the disposal of the members, and during the visit rendered assistance in many ways. The Seven Arches were examined, and afforded delight not only to the geologists, who were numerous, but to all who saw them towering up out of the sea, and worn into fantastic shapes by marine erosion in the quartzites, the common rock of this district. The great arch at Doaghbeg was then visited, being the finest rock feature on the coast, and here a halt was called whilst some collected geological specimens, and others shells, and all rested on the slopes overlooking Lough Swilly and the opposite rock-bound coast of Innishowen, with Slieve Snaght towering up in its midst. Nine o'clock had arrived before the hotel was reached for tea, and even after that meal the young enthusiasts had a boat provided, and rowed around the headland close to the hotel, and into the gloomy depths of a great sea-cave, where the few candles only went to heighten the gloom and frighten the fish, who were doubtless unaccustomed to such visitors, at such an hour. The whole district around Port Salon is a rich one for the conchologists. Next morning when the ordinary members came down to an eight o'clock breakfast they were surprised to find that many had returned from a plunge off the neighbouring rocks, whilst some of the geologists had chartered a car at six o'clock to visit some contorted rocks at the far side of the bay. After breakfast all got ready for the walk to

Rosapenna, the baggage being sent round by Rowross ; and Fanad has not seen such a straggling army for a long time. The weather was warm, and coats were soon doffed, the members, clerical and lay, changing colour from black or grey to lighter hues, whilst the relieving car was piled with the discarded garments. Before noon the old castle at Moross was reached, and a halt made whilst the remains of this old feudal keep were photographed and a section of the party picked up who had boated through the upper waters of Mulroy on a geological hunt under the care of the rector. All were soon on board the ferry boats, which three peasant girls pulled across the tide with skill and ease, bashful, but pleased at the number of visitors. On reaching the other side, the walk was resumed to Rowross Ferry, where boats were in waiting to convey all across to Lord Leitrim's Pier, where the cars were ready to drive past the castle, and through the village of Carrigart, and across a tidal strand to Rosapenna Hotel. This walk was a pleasant feature of the trip, as it afforded opportunities for collecting, whilst the views obtained from the heights were worthy of the journey. Mulroy Bay extended on every hand, its ramifications being quite confusing to the stranger, and it was only when the heights of Ganiamore were subsequently ascended, and the whole Lough appeared like a map, that some idea could be formed as to its shape.

After crossing the great sandhills at Rosapenna, the new wooden hotel appeared, quite a revelation in such a waste. This building was erected at great expense by the late Lord Leitrim, and is a comfortable and commodious structure, built entirely of wood brought from Norway.

After dinner the Rev. Father Gallagher, the parish priest, who had met the party at the ferry, conducted all to the old Church of Mevagh, where there is a large rude cross, and adjoining which upon the cliffs are some ornamentations of a prehistoric age, the meaning of which can only be guessed at. The local information given by Father Gallagher was esteemed and enjoyed by all the members. After tea a short business



CONTORTED ROCKS AT ROSAPENNA.

meeting was held, and the following new members were elected—Fleet-Surgeon Dunlop, Thomas Bland, and Frank Squire.

The third morning, at nine o'clock, the party were photographed on the cars at the hotel door prior to starting by R. J. Welch, who throughout the excursion had rendered assistance in different ways. The long drive around the winding shores of Mulroy Bay, only slightly marred by the rain, brought the party into Rathmullan, where the Rev. Narcissus Batt, A.M., was waiting to show the members some hospitality and point out the features of the old castle and abbey, the history of which has been so finely recorded by John Mitchell as follows:—“Near Rathmullan, on the western shore of Lough Swilly, looking towards the mountains of Innishowen, stood a monastery of Carmelites, and a church dedicated to the Blessed Virgin, the most famous place of devotion in Tyrconnell, whither all the Clan-Conell, both chiefs and people, made resort at certain seasons to pay their devotions. Here the young Red Hugh with MacSwyne of the Battle-axes, O’Gallagher of Ballyshannon and some other chiefs were in the summer of 1587 sojourning a short time, in part to pay their vows of religion, but not without staghounds and implements of chase, having views upon the red deer of Fanad and Innishowen. One day while the Prince was here a swift-sailing merchant ship doubled the promontory of Dunaff, stood up the lough, and cast anchor opposite Rathmullan—‘bark, black-hatched, deceptive,’ bearing the flag of England, and offering for sale as a peaceful trader her cargo of Spanish wine. And surely no more courteous merchant than the master of that ship had visited the North for many a year. He invited the people most hospitably on board, solicited them, whether purchasers or not, to partake of his good cheer, entertained them with music and wine, and so gained very speedily the good will of all Fanad. Red Hugh and his companions soon heard of the obliging merchant and his rare wines. They visited the ship, where they were received with all respect, and indeed with unfeigned joy ; descended into the cabin, and with connoisseur discrimination tried and

tested, and finally drank too deeply; and at last when they would come on deck and return to the shore they found themselves secured under hatches, and their weapons had been removed, night had fallen; they were prisoners to those traitor Saxons. Morning dawned, and they looked anxiously towards the shore; but, ah! where is Rathmullan and the Carmelite Church? And what wild coast is this? Past Malin and the cliffs of Innishowen, past Benmore, and southwards by the shores of Antrim and the Mountains of Mourne, flew that ill-omened bark, and never dropped anchor till she lay under the towers of Dublin. The treacherous Perrot joyfully received his prize, and 'exulted,' says an historian, 'in the easiness and success with which he had secured hostages for the peaceable submission of O'Donnell.' And the Prince of Tyrconnell was thrown into a 'strong, stone castle,' and kept in heavy irons three years and three months, 'meditating,' says the chronicle, 'on the feeble and impotent condition of his friends and relations, of his princes and supreme chiefs, of his nobles and clergy, his poets and professors.'"

The steamer soon crossed the ferry to Fahan, from whence the train brought all back to Derry, where some time was allowed to examine the Cathedral and the city walls which had given such a heroic resistance to King James in 1688. Dean Smyly had thoughtfully arranged to have the Cathedral open at a suitable hour, thus enabling all to view the monuments and relics of the siege, and also the recent conservation of the roof and the new chancel, a most graceful and perfect structure, and quite in harmony with the older church. Derry was left at 5.30 and Belfast reached at nine o'clock.

11 *August.*

BALLYMENA AND SLIEVE MIS.

Ballymena, Slieve Mis, and the Braid Valley were visited on the 11 August. Arriving at Ballymena the party was met by W.

J. Knowles, M.R.I.A., and the Rev. George Buick, A.M., local members, who gave assistance throughout the day. No time was lost in mounting the machines and driving through the town, going by the old road past Drumfane Fort to Broughshane, stopping at the quarry to examine the glacial sands and gravels. The current bedding is here finely displayed owing to the recent weathering; the softer strata have been taken full advantage of by the martins, who have burrowed in and made their nests in numbers. The next halt was made at the church of Broughshane, to the east of which is the cross-marked grave of the club's late president, Rev. Canon Grainger, whose kindly welcome and local information was missed on this, the first, occasion, of the club's visit to "Canon Grainger's country" since his demise. The slopes of Slieve Mis (1,437 feet) were soon reached, and its heights ascended. This is an old volcanic neck, and from its vent doubtless partly flowed that basalt which forms such a feature of our County Antrim surface. At Ballyligpatrick, between Skerry and Slieve Mis, Saint Patrick, then a captive youth, herded the flocks of the Chieftain Milchu for seven years, and here it was he dreamed those dreams and saw the visions which were subsequently to be realised. When Saint Patrick returned to Ireland on his missionary labours he returned to the home of his former owner in the valley of the Braid, there expecting to find Milchu, and convert him and his household to Christianity. The chieftain hearing of the fame of his former slave, dreaded his coming, thinking Saint Patrick would enslave him in turn. When the saint had mounted the slopes of Slieve Mis he found Milchu had gathered his goods together like a funeral pyre, and set fire to the same, with himself upon the top, perishing in the flames. Saint Patrick gazed sadly for two hours upon the sight, and then returned to Strangford. The summit of the mountains bears traces of earth-work, but when these were thrown up it is hard to say. They may be the work of some rude Dalaradian tribe, who made this a stronghold in the eighth century, for the Annals of the Four Masters informs us

that a bloody battle was fought here in A.D. 771, or they may be the remains of the hastily thrown up defences of the forlorn and quickly fading remnant of the insurgents of '98, of whom Henry Joy M'Cracken was leader. The descent from the hill having been made, a pleasant drive brought the party to the ancient Church of Skerry (Sciric), situated on a rocky eminence as its name denotes. Formerly "stations" were held here, and great crowds assembled round what is known as "Saint Patrick's foot-mark," a small depression in an adjoining rock. Close by is the Holy Well called Tubernacool, which Colgan styles "*fons miraculosus*." In this district were found the flower *Gentiana campestris*, and several roses, including the rare *Rosa sabini* and other interesting plants. The return journey was then made to the Adair Arms where tea was partaken of, after which the members visited the Parish Church, on the invitation of the rector, and inspected the valuable collection of antiquities belonging to W. J. Knowles.

25 August.

DUNDRUM AND MAGHERA.

The fifth excursion of the season was made on Saturday, 25 August, to Dundrum, when a party of nearly fifty started by the 9-15 train from Belfast, and their numbers were augmented from several stations along the line. The great Anglo-Norman donjon keep of De Courcy was the first object of attention. When the company were grouped in the castle enclosure, the President addressing them from the foot of the stair, described briefly the principal features, the winding road up to the half-ruined barbican towers and portcullis, the castle enclosure wall which follows the line of the rocky escarpment, and the huge circular donjon keep. The wooden gallery for defenders, which projected from the top of the tower, and also from the outer enclosure wall, where the holes for its beams may still be seen, was also described, as well as the later

Elizabethan enclosure and buildings which occupy the lower level. The situation of the castle and its disadvantage for modern defence was also noticed, it being dominated by a hill only a few hundred yards distant, and the steep, rocky ledges which offer quite as much cover for assailants as protection for defenders. Another feature commented on was the way in which this and most other Anglo-Norman castles of Down were planted with the sea for a secure base in preference to the difficult and dangerous land journey by or through the Mourne Mountains.

From thence some of the party went to botanise and search for prehistoric relics on the sandhills, but the majority proceeded to the village of Maghera, about two miles distant. The village itself, with ruined mills and farm-steadings, seems rather in a state of decline. The chief interest centres in the ancient church and round tower. Judging from the masonry, the latter appears to be one of the older and ruder class, but the stump only remains, for in the year 1704 the upper part of the tower was blown down in a storm, and, owing to the strength of the mortar, it lay unbroken along the ground, according to a contemporary account, "like a huge gun," which is represented now by a grass-covered mound. Of the church very little more than the west gable and part of the side walls are now standing, and these are so overgrown with ivy and old half-decayed elder trees as to tell but little of its original date or character. If we can rely upon Lewis' Topographical Dictionary, however, sixty years ago a "fine Norman doorway, since destroyed, was to be seen in the west gable, and two graceful lancet windows in the south wall." Inside the church is a slab with armorial bearings and the date 1674, quarterings apparently of the Harrington and Hamilton families. Outside is part of an incised horizontal cross, now doing duty upside down as a perpendicular headstone. The whole site, if carefully investigated, might bring to light some interesting relics, and it is to be hoped the lord of the manor or some other persons may be induced to take up the exploration. From Maghera a

visit was paid to the pillar-stone and cromleac at Slidderly Ford, which have been described and figured in the Proceedings of the Club. The sandhills were then searched for rare plants and relics from the prehistoric encampments. Amongst plants the following were found, the meadow rue (*Thalictrum minus*), the houndstongue (*Cynoglossum officinale*), the sea spurge (*Euphorbia paralias*), and the eryngo (*Eryngium maritimum*). It is only at rare intervals that new sites of encampments are laid bare by the winds, and although some flint-flakes and teeth of animals were found, there nothing of importance was obtained. These vast hillocks of blown sand are themselves of considerable interest, for the shells found in them indicate that they were under a sea which stood at a much higher level than at present. The sand held imperfectly together by the coarse and scanty bent grass is being everywhere cut into by the winds and carved out into ridges and ravines as steep and fantastic as the cornices of drifted snow on an Alpine summit. On the hollows the sand lies in ripple-marks caused by the currents of air exactly similar to those caused by the flowing water in the adjacent beach. Some of the party had an opportunity of inspecting in the village a grotesque Norman corbel stone said to have been found in the castle. It is of the same date, but represents work of a richer type than any part now remaining in the building. Tea was partaken of at the Downshire Arms.

19 September, 1894.

LANGFORD LODGE.

The last excursion of the summer season was held to Langford Lodge on Saturday, 19 September, when a party of over a hundred participated in the day's pleasure. The beautiful weather enjoyed was only in keeping with that of the other five excursions held during the year; greatly favouring the Club in this respect, considering the inclemency of the season. The party started from the Free Library in brakes, supplied by

Adam Turner, going by the Crumlin Road over the hills, where the prospect of the lough spread out like a map, with the smoky city in the foreground, looked pleasant in the sunshine.

Was it not on these hills that Niece O'Haughan, the famous Antrim outlaw, had his place of hiding? Many an unwary traveller from the mud-walled city of Belfast regretted his tarrying at the Donegall Arms or the White Cross Inn when darkness overtook him at the Catcarn. The undaunted Niece eyed the fat farmer returning to Ballyutoag with the price of his season's crop in his pocket, and if the treasured pelf was not easily parted with a nasty "job" soon effected the transfer. No timid thoughts troubled the members as they drove through the rich stretches of Killead parish over the Clady Water and past the sleepy little village of Crumlin to Langford Lodge, the home of the Rev. Arthur H. Pakenham, J.P. The hospitality of the Pakenham family was extended to the members, the grounds and house being freely opened by the owner, and the many and rare objects of interest and value placed on exhibition. The Pakenhams have long been a race of soldiers, and it was hard to know which to admire more—the relics of a past martial glory, tattered flags from British victories in the Peninsula, with personal adornments and trophies of many a stiff encounter, or the unique and wonderful collection of valuable stones, plain and utilised for the ordinary articles of a luxurious household. Pistols taken from the carriage of King Joseph at the battle of Vittoria by General Pakenham were carefully examined, whilst the great petrified trunk of *Araucaria excelsa* brought from Arizona, polished on the top, showing beautiful hues, attracted attention; but selection is invidious where every object was of interest either from appearance or association. After leaving the house the lawns and gardens were visited, the admirable collection of old herbaceous plants being quite a feature, affording such a relief to the usual stiff carpet bedding seen of late at gentlemen's houses. Great clumps of the *Anemone japonica* mingled with marguerites and dahlias, phloxes, verbenas, and tropæolums, each vieing with the other in hue and form. The

firs and flowering shrubs mingling together in beauty and variety on the terrace overhanging the waters on Lough Neagh making a scene of quiet beauty not easily surpassed in these Northern latitudes. Boats had been provided by M'Garry, the fisher of eels, at the foot of the lawn to row the members to Ram's Island, there being no wind for sailing, to see the ruined round tower, the only remains of a large ecclesiastical settlement. The plash of the oar and the notes of the birds alone broke the silence of the wooded island, floating as it were, in a sea of glass. Well might the local poet say :—

“It's pretty to be in Ballinderry,
It's pretty to be in Aghalee ;
It's prettier to be in bonny Ram's Island,
Sitting under an ivy tree.”

The branches of the trees upon the lawn made an ideal shade for tea in the afternoon, when all the members, as it were trooped in from the four airts to that repast. Some came from the flower gardens, some from a botanical hunt by the damp margin of the lake, whilst the major part came from the island with stimulated appetites after the row upon the water.

WINTER SESSION.

NOTE.—The authors of the various Papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

26 October, 1894.

SOCIAL MEETING.



THE Winter Session of the Club was opened by the usual Social Meeting in the Exhibition Hall of the Royal Botanic Gardens on Wednesday evening, 26 October, when there was a large attendance of members and friends, notwithstanding the very inclement weather. The upper portion of the hall had been beautifully arranged with plants and flowers, mingled with fountains and fairy lamps, by Charles M'Kimm, the curator of the Gardens, whilst the walls of the other end of the hall were covered by a collection of fern fronds, grown by W. H. Phillips, and not to be easily equalled for rarity and appearance. Tea was made by the ladies of the Club from seven till eight o'clock, when most of the company had arrived. After tea, the President bade all welcome to this the annual exhibition of the Club's work, and pointed out the different exhibits. The principal one contained a collection of geological specimens, illustrating the Carboniferous formation, including some ornaments made from coal, lent by James Stelfox, C.E. This exhibit was under the care of William Gray, M.R.I.A., Joseph Wright, F.G.S., and Alexander G. Wilson. The side walls were covered by a large and valuable collection of photographs taken during the season by the members on the Club's excursions; also an explanatory geological

series by R. Welch, and a comprehensive set of ethnographical views illustrating some of the manners and customs of the inhabitants of Ireland. There was also a series of Bangor yachting views, showing the Britannia and other yachts, exhibited by James A. Pollock. John Vinycomb, M.R.I.A., exhibited a series of *Ex Libris*, a subject upon which he is now accepted as an authority, whilst Ernest Hanford displayed a representative series of water colours, illustrating the favourite district of Cushendall. John Hamilton excited much interest with the objects in his aquaria. Fifty rare Irish plants collected during the past season, for which a special Club prize had been awarded, were exhibited by R. Lloyd Praeger, M.R.I.A., of Dublin, who was present, and gladly welcomed by his old friends and fellow-workers. Stereoscopic views were shown by Dr. Cecil Shaw, and under the guidance of Dr. St. Clair Boyd there was a display of microscopes by the members of the Club. Mrs. Allan, of Stormount Castle, exhibited a huge tarpon, whose silvery scales attracted much admiration. Mrs. White-Spunner had on view her album of Irish flowering plants, which was shown at the Chicago Exhibition. One of the pleasantest and certainly the most amusing feature of the evening was the series of photos., illustrating in a comic and whimsical fashion the manners and customs of prehistoric man. These views, clever in themselves, were rendered more attractive by the descriptions of William Gray, who, in his entertaining manner, kept the audience in fun for fully half an hour. A series of sea-gull photos. were then shown and some Club excursion views, taken by Welch, Gray, Leslie, and MacLean. After the lantern a short business meeting was held, when the following twenty-one new members were elected, bringing up the total membership to about 500, the largest ever reached in the history of the Club :—David Strain, Miss M. J. Hanna, Joseph H. Vint, David M'Mordie, John M. M'Alery, Robert Davison, Miss Alice J. Bell, William Hazelton, Clement C. Ewart, Ernest Ewart, J. Workman, J. C. Robertson, F. Howard Sinclair, M.D., Mrs. Annie Cleland, Rev. William Colquhoun,

R. M. Frazer, M.B., Miss Herre, Miss Nan Sinclair, Robert Walsh, John H. Barbour, and Lakes Roscorla.

22 November, 1894.

The first business-meeting of the Winter Session was held in the Museum, College Square, on Tuesday evening, 22 November, when the President, F. W. Lockwood, C.E., delivered the opening address.

The President, in his opening remarks, congratulated the Field Club upon its continued prosperity and the recent great increase of zeal, as indicated by the formation of various sections, such as the Microscopical Committee, the Celtic Class, the Photographic Committee, and the Geological Committee, all of which were doing good work. He then went on to comment at greater length upon the investigations by the Geological Committee into glacial phenomena generally. The various changes of opinion on this question were commented upon, and the principal theories upon the Great Ice Age described. The more striking of these are by this time familiar to most if not all members of the Club. The coating of stiff clay, with subangular boulders of various sizes, many of them more or less polished or striated, scattered irregularly through it, which covers more than half the British Islands; the beds of stratified sand or gravel which are here and there associated either above or below and sometimes in the middle of this clay; the smoothed, rounded, and polished surface of most of our northern rocks; the various lake-basins, large and small, which are so numerous in the more hilly parts; and the heaped-up banks of boulders and other *debris* which lie in the numerous valleys, as well as the erratic blocks which line our hill sides and are sometimes scattered over our plains—all these are now unanimously attributed to the action of ice in some form or another, and the period, very recent geologically speaking, to which they belong is now familiarly known as the "Great Ice

Age." Thirty or forty years ago it was universally considered that it was coincident with a great submergence of the land—perhaps to nearly 2,000 feet below the present level—and that a sea loaded with icebergs, drifting generally from north-east to south-west, had deposited the clay and boulders, much as is now being done between the mouth of Davis Straits and the Banks of Newfoundland, and that the polished and striated rocks which underlay the clay were due to the grounding of these wind and tide driven icebergs upon the shore. The ingenious author of "Frost and Fire," a charming book to read by the way, published nearly thirty years ago, gives a map showing the British Islands submerged 2,000 feet, with channels where several Scottish rivers now run, through which these icebergs were supposed to have come drifting from Scandinavia. The high ground not submerged had local glaciers that helped to swell the number of icebergs, which glaciers as the climate moderated shrunk up, leaving moraines and ice-worn valleys behind them. At the height of the glacial period, according to this theory, Scandinavia was covered by a vast sheet of ice to even a greater extent than Greenland is now, because the ice stretched so far out into the bed of the North sea as to infringe upon the coast of Great Britain and to meet and coalesce with a great sheet which enveloped the whole of Scotland, which sheet in its turn spread westward so as to glacialize the outer Hebrides, and southwards so as to fill up the Irish Sea. Here on its south-east side it flowed round and met with an ice field which covered the mountains of Cumberland and Westmoreland, and reinforced by this, pushed its way through various gaps in the Pennine range—the "backbone of England"—till it died away in the plains of Yorkshire and Durham and the Midland counties. Upon its south-western side it also met with another great mass of ice, which probably had its centre over the Sperrin Mountains in North Tyrone and South Derry, the two masses or streams meeting in Antrim and Down, where they breasted up against and partly over-rode the Mourne Mountains. There were also local icefields of considerable extent in Wales,

Wicklow, Kerry, and Connemara. Many speculations have been on foot as to the conditions which could lead to such a marvellous extension of ice. The earlier ones, following the well-known principles of Lyell, sought to find in changes in the position of sea and land and in the diversion of ocean currents, such as the Gulf Stream, a sufficient explanation. Every geologist will always freely admit the great influence which such changes must always have upon local climate, and which is amply proved by a comparison between the present condition of Labrador, for instance, cold, bleak, and infertile, and Norway, with its smiling, tourist-frequented valleys, or between Greenland, smothered under a dome of ice, and the middle of Siberia, the plains of which, in spite of the winter cold, are covered with flowers every summer, as well as between the northern and the southern hemispheres generally, which latter, although actually nearer the sun in summer than ourselves, is yet undergoing at present a modified glacial epoch. Whilst admitting all this, many have felt that some more far-reaching cause would have to be sought for. This the late Mr. Croll claimed to have found, and has set forth in his remarkable work "Climate and Time." Croll's theory has been adopted by Sir Robert Ball, and the eminence of his name has now led to its being often called Sir Robert Ball's theory. Most of you are familiar with it, and I need not spend time over it this evening. I will only remark that, notwithstanding the convincing nature of its demonstration, some recent geologists have challenged it, apparently on the ground that it puts the last glacial epoch (if there have been more than one) too far back, 70,000 or 80,000 instead of, say, about 10,000 years. Perhaps the most interesting battle of the next few years amongst geologists will be between the advocates of a great ice sheet and the advocates of a great submergence, with merely a system of local glaciers. It must always be remembered, however, that the greater the submergence of the land the less room would be left for an accumulation of ice sufficient to give rise to large glaciers capable of detaching numerous bergs. Again, some persons may recollect how a few

years ago, when Lord Salisbury was Foreign Secretary and there was a panic about the Russian advance in Central Asia, he said people's fears would be much allayed if they would only study large scale maps. We may be allowed to reverse this process, and to suggest that if geologists, instead of only looking at a big map of a small piece of country, were sometimes to look at a map of the whole British Isles, or, better still, of Europe or the northern hemisphere in its entirety, they would see that in proportion to the whole extent of the globe a very small patch of snow comparatively would be sufficient to form such an icecap as would cover Scotland and stretch over the adjacent sea channels to Ireland, the Isle of Man, and the outer Hebrides. A very slight lowering of the temperature of the northern hemisphere would permit of a sufficient accumulation of snow to accomplish this. Many people are apt to imagine that a glacial epoch requires intense cold for its production. This is due to a misapprehension of the conditions. The centre of Eastern Siberia is said to contain the pole of greatest cold, the thermometer falling in mid-winter to something like eighty degrees below zero of Fahrenheit, or over 100 degrees of frost. Yet Siberia scarcely possesses a glacier, and, notwithstanding that the ground is permanently frozen a few feet below the surface, the winter snow vanishes every summer. As Wallace, in one of his chapters of "Island Life," has pointed out, a very moderate fall of temperature below the freezing point, coupled with a large precipitation of moisture, is sufficient to bring about an enormous accumulation of snow. The air currents of Siberia, as of the great plains of North America, are comparatively dry; consequently, in spite of the cold, there is no accumulation of snow. With mountains to cause precipitation, and the moisture-laden winds round islands, such as Greenland, Iceland, and the North American Archipelago, we have large accumulations of ice. It must be always borne in mind that, whilst heat dissipates itself as soon as formed by being carried away in the form of rain drops or vapour, cold the moment it falls below the freezing point of water becomes locked up, is deposited as

it were in a bank, and put out to usury ; for the greater the accumulation of ice the more the air is cooled, and the greater the precipitation, and the resulting cloud and fog, as well as the snow and ice, instead of, as in the case of transparent vapour, absorbing the rays of heat, simply reflect them, and, glancing off into space, they are lost for ever. There is, again, what may be termed the alternate theory—viz., that, if not a complete icecap, there was a considerably greater elevation of the land than the present level, with a series of glaciers much larger in extent than any at present known in Europe, and that following this there was a great submergence. Everybody, I think, concedes the fact of a submergence of some sort ; the real question is as to its extent. The chief evidence which has been until recently relied on to prove its extent is a certain stratified bed containing fragment of sea shells upon Moel Tryfaen, in North Wales, at a height of about 1,300 feet, and a similar bed on the Two Rock Mountain, near Dublin, at about the same height, and beds in Cheshire and Scotland at a somewhat lower level. These were supposed to prove that towards the close of the glacial epoch the British Isles, or all but a small portion in the south, were sunk at least to the greatest of these depths under the sea, and, as Great Britain has since been joined to the Continent, that they were then raised 500 or 600 feet for a few thousand years before they settled back again to their present level. Professor Hull, in a recent paper, seems to take a new view, that along an axis running nearly east and west through Dublin, North Wales, and Cheshire, &c., the land sunk at least 1,400 feet, and that the sinking became rapidly less as you go farther north and south of that line. An American geologist, who can at least claim the merit of having studied British glaciology as carefully as most English observers, the late Mr. Carvill Lewis, has started some very bold theories, which he backs up, however, with a great deal of both skill and knowledge. He puts aside altogether, except as regards about three or four hundred feet, the idea of a general submergence, and, holding firmly to the belief of a great icecap both in

Britain and America, he professes to trace all along its southern boundary the remains of a great terminal moraine. It was the advance of this icecap which, filling the bed of the Irish Sea, forced up in several places portions of shells, in a broken condition, to the elevations already referred to. Amongst other proofs of this he holds to be the general direction taken by the boulders and erratics whose parent rocks are known, and the comparative scarcity of stratified and shelly beds, the absence of which seems hardly compatible with a long or general period of submergence. We are bound to remember that all those who have advocated the putting of extensive land ice into the forefront of their theory, and the regulation of submergence and floating ice to a secondary place, have been impelled by what appeared to them to be the exigency of facts. Every geologist is familiar with the perpetual variations in the level of land and water : it is part of his stock-in-trade, without which geology as a science could not exist ; but we are not familiar with such comparatively rapid and extensive variations as we are asked to believe in by the advocates of glacial submergence. We cannot rationally blame geologists of the school of Carvill Lewis and others if they say that to admit such rapid oscillations in recent times is at least as great a tax upon our powers of belief in the probable as to admit the extension of ice for which they contend. Nearly all the observers, again, who have made a study of glacial striæ, and have mapped their results, have agreed that the striæ indicate a condition of land ice approaching the nature of such an icecap as I have described. The soundings in and at the mouth of the sea loughs or fiords of the West of Scotland, and several in Ireland—Carlingford Lough for instance, and probably Lough Swilly, as well as the estuary of the Clyde right out into the North Channel—are also attributed by Sir A. Geikie and others to the action of glaciers of such extent that they could only have radiated from an icecap as already described when the land was somewhat higher than at present. There are other evidences, however, of no little importance which seem

to point to a contrary conclusion. It is singular how little use appears to have been made of the microscope in these investigations. Marine clays almost invariably yield specimens of foraminifera and kindred forms which are strictly sea-water genera, yet except by our fellow-member, Mr. Joseph Wright, the boulder clays do not appear to have been systematically searched for them. It has for long seemed to me that one of the most useful and interesting branches of investigation into the glacial clays would be the careful microscopic examination and classification of all the boulder clays in the country, not merely of one sample from each bed, but of samples taken both from the top and bottom of each, especially where there is any apparent difference in their bedding or composition. Their height above the sea level should also be approximately recorded. Were this done generally over the country, and it has already in our district been well begun, and the tracing of erratics, in which so much also has already been done, completed, we should then be in a position to attempt to reconcile, or otherwise deal with, the conflicting theories. So far as this section of the country is concerned the Geological Committee of the Club cannot do better than in continuing the work they have so energetically commenced, and if they can persuade a sufficient number of competent observers in Great Britain to take up the microscopic investigations of the boulder clays there, the geologists of Britain will be in a fair way to solve the great glacial problem.

Joseph Wright, F.G.S., after complimenting the President on his interesting inaugural address, proceeded to refer to the boulder clay and its origin. He mentioned that with geologists in the North of Ireland it had always been considered as a marine deposit, and so long ago as 1841 General Portlock in his report on the geology of Londonderry recorded the occurrence of marine shells in this drift. Subsequently S. A. Stewart published in the Club's Proceedings a list of the mollusca of the boulder clay in which he recorded the occurrence of shells from a number of North of Ireland localities, proving that the clay

in question was fossiliferous. Some of the bivalve mollusca, especially two species of *Leda*, were found by him having the valves united, showing that these species must have lived on the spot on which they were found. He made a microscopic examination of the same clays, and in every case he found them to contain foraminifera. He also met with foraminifera in many samples of the clay which were devoid of molluscan remains, these tiny rhizopods being as perfect as when brought up by the dredge from our existing seas. From that time up to the present further examinations of the boulder clay have been made and always yielded similar results.

He also stated that through the courtesy of a Scotch geologist, James Neilson, he received five samples of boulder clay from the vicinity of Glasgow, in all of which foraminifera were present. In addition to these, he received from John Stears, of Hull, a packet of boulder clay from that locality. This sample of English boulder clay was also found to contain foraminifera. These results are interesting by reason of the common occurrence of these marine microzoa, most English and Scotch geologists having been hitherto of the opinion that the boulder clay was the result of land ice, and had not a marine origin. This important statement of original research was greeted with applause.

A. Percy Hoskins, F.I.C., F.C.S., read the following analytical paper on a sample of glauconite from Woodburn, Carrickfergus, which was well received:—

The immediate object of this note is to give an account to the Belfast Naturalists' Field Club of a specimen of Glauconite with which the energetic Hon. Secretary of our Geological Committee was kind enough to provide me some little time ago, but as this communication is to be read at a general meeting perhaps it will be as well to give a short résumé of the information we have of Glauconite in general before descending to the discussion of this specimen in particular.

Glauconite then may be described as essentially a hydrous silicate of iron and potash, but of very variable composition, and

generally containing varying proportions of other bodies, such as alumina, lime, and magnesia. It occurs extensively disseminated in small opaque grains, especially in the lower parts of the chalk marl, chloritic marl, and greensand; but it is found also at different horizons in the whole geological series of rocks from the Cambrian up to the most recent Tertiary layers, and, indeed, is particularly interesting in being one of the very few silicates which are in actual process of formation on the sea bed at the present time. The physical characteristics of the grains are practically the same throughout the series; the normal colour is dark green, but sometimes appears as yellowish, greyish, or even almost red. These variations of colour, however, mean, at least, the commencement of decomposition. The size of the grains is usually about one millimetre in diameter, and although much larger masses are sometimes found these are merely agglomerations of the smaller grains. The hardness is about that of rock salt. Under the microscope the grains appear quite homogeneous unless some foreign body is enclosed, or, as sometimes occurs, the commencement of decomposition gives a more or less zony appearance to them.

The mode of formation is a much contested point, and is not yet decided; but, as bearing upon this point, the following remarks culled chiefly from the "Report on Deep Sea Deposits" of the "Challenger" expedition may be of interest:—

Glaucinite is found not universally distributed over the floor of the ocean but in deposits along continental shores and not in the deep pelagic ones. In marine deposits it is always associated with the casts of Foraminifera, and roughly resembles these in form. It is characteristic of, and sometimes abundant in, green muds and sands, and also in Globigerina ooze, especially when this contains a good deal of detritus from neighbouring continental land. It is not found in true pelagic deposits, nor is it usual where the detrital matters from rivers are abundant, but along the high bold coasts where accumulation is slow Glaucinite is found in typical form and great abundance.

The usual depth at which Glaucinite occurs is from 200 to

300 fathoms, but it is found occasionally as far down as 2000 fathoms. It is usually accompanied by such minerals as quartz, orthoclase, mica, garnet, epidote, etc., and fragments of ancient rocks, such as chloritic rocks, granite and mica schists, etc., and in modern deposits by organic matter of vegetable origin and with phosphate of lime. It never occurs in true volcanic muds and sands, and it is hardly ever found in pure carbonate of lime deposits, but is always associated with sandy calcareous deposits, and is most probably formed in situ and not conveyed like the land rocks always found with it, and from which it is most likely formed by the prolonged action of the sea water. The conclusion arrived at in the "Challenger" Report is that Glauconite is probably initially formed in the cavities of calcareous organisms by infiltration, the composition of the mineral, which is really a mixture, being determined in part by the organic matter in the shell.

We come now to our own local specimen, the following details have been given me by Miss Thompson :—

"The Glauconite grains occur in a cliff of the so-called chloritic sandstone division of the upper greensand, which belongs to the Cretaceous Period. This cliff is part of the valley which has been cut in the Knockagh Mountain by the Woodburn River ; or more simply, the Woodburn River has cut through the Cretaceous rocks and exposed this face of highly fossiliferous greensand."

The method adopted for obtaining the grains was this:—The rock was pulverized, washed in a muslin bag until the water ran off tolerably clear, the powder dried and sifted through coarse muslin, and then with the help of a lens of low magnifying power the grains of Glauconite were picked up by means of a very fine sable brush moistened in a tiny vessel of distilled water, into which the collected grains off the brush were dropped. The field of the lens was large enough to admit of this little vessel of water and a tray of glossy brown paper (upon which pinches of the powdered rock were shaken) at the same time, so that no time was lost in dropping the Glauconite into

the water as quickly as it was gathered. Great care was taken to have the grains as uniform as possible in size and colour. The sample received for analysis was very uniform in size and colour, and weighed a little over one gramme. It consisted of dark green granules of rather less than one millimetre in diameter, very homogeneous and of a rounded contour, intermixed with a few white particles. The grains were soft and readily powdered. The powder was treated with cold dilute hydrochloric acid, well washed, dried at 90°C. in an air bath, and the resulting green powder taken for analysis.

0.3575 gr. was decomposed with moderately concentrated sulphuric acid, the silica separated in the ordinary way, and the solution used for the determination of total iron, alumina, lime, magnesia, potash, and soda by the usual methods; 0.1975 gr. was ignited for combined water and organic water; 0.2780 gr. was decomposed by heating in a current of CO₂ with moderately concentrated sulphuric acid and titrated with standard permanganate of potash for ferrous oxide. The results obtained were:—

S ₂ O ₂	Fe ₂ O ₃	Al ₂ O ₃	FeO	CaO	MgO	K ₂ O	Na ₂ O	H ₂ O	Total
40.00	16.81	13.00	10.17	1.97	1.97	8.21	2.16	6.19	100.48

Remembering what has been already said upon the variable composition of Glauconite it is not surprising to find that this example shows some deviations from the figures given for other Glauconites, although in some particulars these are noteworthy. To illustrate this and also to show how other Glauconites vary among themselves two tables of analyses are appended. Table 1 contains the analyses by Sipöcz of four samples of marine Glauconite from the "Deep Sea Deposit" volume of the "Challenger" Report. These were all taken at a depth of 410 fathoms, and in Lat. 34° 13' S and Long. 151° 38' E; yet taken as they were from practically the same spot the variations, especially in the essential constituents—silica, ferric oxide, potash, and water—are most pronounced. Our Woodburn Glauconite shows many great differences from all of these, and we may note among the essentials that the silica is over 13% lower

than the mean of the four, and more than 10% lower than the least of these, the ferric oxide though higher than the lowest is still more than 4% less than the mean, the potash is nearly double the highest given in the four, while the water is somewhere about the mean. One great difference observable is in the ferrous oxide, where against a maximum of 1.95% in the marine Glauconite the Woodburn sample shows 16.81%. To turn now to Table 2. This is a résumé of twelve analyses of Glauconite from rocks which have been selected by Professor Cole as fairly similar to ours, and which are published in the "Handbuch der Mineralogie" by Dr. C. Hintze for 1892. Here, again, though we might fairly expect a closer correspondence with our own than in the case of the marine Glauconite, we find in comparing them with each other and with our Woodburn mineral the same discrepancies in nearly every particular—the silica varying from 58% to a little over 43%, which, however, is still somewhat higher than ours, the ferric oxide varying from 32.8% to (in three analyses) nil, our figure coming close to the mean; and, in fact, a glance will show that these differences obtain throughout, so that the average result is really useless as a standard. It will be noticed that the ferrous oxide which is so low in the marine Glauconite of Table 1 gives us in Table 2 figures much more nearly agreeing with the Woodburn Glauconite, the rocks being similar in this case.

The one point which does seem to come out clearly in this comparison is the relative poverty in silica of the Woodburn specimen, though even that is not much below the lowest in Table 2. In this connection it is worth noting that in Table 1 the silica is lowest and the potash highest in these cases in which the green, and especially the dark green, casts predominate, casts agreeing in appearance with those composing the whole of our Woodburn specimen. Whether this is merely a coincidence in a particular case or has a definite significance is not certain. The fact that where the dark green casts are most numerous the mineral particles and silicious organisms are few probably accounts for the variation in silica to a large extent,

while it is not unlikely that in the neighbourhood of the large deposits of alkaline salts at Carrickfergus any minerals which contain soda and potash in varying proportions would contain them in relative abundance. It may be interesting here to notice the figures given in the volume of the "Challenger" Report referred to above for a reddened Glauconite in which the silica is exceptionally low, viz.:—

SiO ₂	Fe ₂ O ₃	Al ₂ O ₃	FeO	OaO	MgO	K ₂ O	Na ₂ O	H ₂ O	Total
27.74	39.93	13.02	1.76	1.19	4.62	0.95	0.62	10.85	100.68

To which the remark is attached "the high percentage of ferric oxide and water points to a decomposition of this mineral, which has been transformed into limonite as is often the case in Glauconite from the geological strata with loss of silicic acid and potash ; but this explanation can hardly be given for this specimen which consists of casts from a coral sand." But no alternative suggestion is made, and neither will the suggestion hold in the case of our own Glauconite, for while the silica is low the ferric oxide is not particularly high, nor is the water, while the potash is seemingly higher than usual. Moreover, the casts are green and show no signs of decomposition at all, which would certainly be the case if this decomposition into limonite were taking place. Professor Cole has suggested that possibly in the course of ages silica has actually been abstracted in solution ; but in this case, since the silica must have been in combination when present in the mineral, the grains should show some signs of the decomposition which must have taken place, and no such signs are visible. The only conclusion to be arrived at in our present information would seem to be that the Glauconite from Woodburn is of the same composition as when originally formed, but why in this spot it should contain an unusually small percentage of silica is beyond my power to suggest.

I trust I may have a further opportunity of examining specimens of Glauconite from this locality with a view to determining the constancy or otherwise in composition of this deposit.

In conclusion, I wish to express my sincere thanks for the kind assistance I have received from Miss S. M. Thompson, Macedon, Belfast, and Professor Grenville A. J. Cole, of the Royal College of Science, Dublin, in the preparation of this note.

TABLE I.

Four analyses of marine Glauconite by Sipöcz taken at 410 fathoms, Lat. $34^{\circ} 13' S$, Long. $151^{\circ} 38' E$. From the "Challenger" Report.

		1	2	3	4	Mean.
SiO ₂	...	56.62	50.85	51.80	55.17	53.61
Fe ₂ O ₃	..	15.63	24.40	24.21	21.59	21.46
Al ₂ O ₃	...	12.54	8.92	8.67	8.12	9.56
FeO	...	1.18	1.66	1.54	1.95	1.58
CaO	...	1.69	1.26	1.27	1.34	1.39
MgO	...	2.49	3.13	3.04	2.83	2.87
K ₂ O	...	2.52	4.21	3.86	3.36	3.49
Na ₂ O	...	0.90	0.25	0.25	0.27	0.42
H ₂ O	..	6.84	5.55	5.68	5.76	5.96
Total,	...	100.41	100.23	100.32	100.39	
Mineral Constitution of Deposit.	Casts — White, pale grey, and yellow	Per Cent. 65	Per Cent. 15	Per Cent. 10	Per Cent. 30	
	Pale Green	20	35	25	40	
	Dark Green	11	45	60	20	
	Mineral particles and siliceous organisms	14	5	5	10	

TABLE 2.

Résumé of 12 analyses of Glauconite from rocks similar to ours from the "Handbuch der Mineralogie," by Dr. C. Hintze, 1892.

	Mean.	Max.	Min.	Remarks.
SiO ₂ ...	50·27	58·17	43·60	Absent in 3 analyses.
Fe ₂ O ₃ ...	17·94	32·80	nil.	
Al ₂ O ₃ ...	5·69	10·09	1·50	
FeO ...	8·16	21·78	2·64	Absent in 8 analyses. Do. + do.
CaO ...	0·78	3·21	nil.	
MgO ...	2·29	6·21	nil.	
K ₂ O ...	6·12	8·79	3·10	Only occurs in 2 analyses 0·91 & 0·21.
Na ₂ O ...	?			
H ₂ O ...	8·23	14·70	4·71	

R. Lloyd Praeger, Hon. Secretary of the Dublin Naturalists' Field Club, gave a short address on the subject "The Irish Field Clubs and Field Club Work." He first briefly sketched the history of the Four Field Clubs of Ireland,—those of Belfast, Dublin, Cork, and Limerick,—and referred to his article recently published in the *Irish Naturalist*, in which those histories will be found more fully set forth. The present position and resources of these Clubs were next discussed, and the extreme importance of joint meetings was urged, by means of which the Clubs may get to know more of each other's doings, and work in harmony for the attainment of their mutual aims. It was pointed out how much encouragement and help the Clubs can give to each other, and the speaker concluded :—Is it not in fact desirable in the highest degree that all the Irish Field Clubs should assist each other ; that they should know each other better, and feel that they are comrades, working together for a common object ; that there should exist a bond of friendly

communication between them, and that as frequently as possible the members of the various Clubs should meet each other? These questions have had the earnest consideration of the Secretaries of the Irish Field Clubs for some months past, and the result of their consultations will shortly assume the form of a definite proposal. It is suggested, in short, that an Irish Field Club Union should be formed, the business pertaining to which will be carried on by a Committee composed of representatives of all the Clubs; that the Union should have for its objects the consideration of matters of general Field Club importance, the providing of mutual help among the Clubs, and the bringing about, by means of joint meetings and otherwise, of a closer and more frequent intercourse. Pending the general conference of the Irish Clubs, which it is proposed to hold next summer, a memorandum, embodying the above suggestions, will shortly be submitted to each Club, in order that the benefits which will arise from the Union may come into operation as early as possible. At next year's conference it is confidently anticipated that the foundations will be laid of a true and lasting Union, a bond of sympathy and friendship and scientific intercourse that will help the Clubs in their work, and stimulate them in their forward march; a Union which will be a pillar of strength to the Field Clubs, an aid to British Science, and a credit to Ireland.

The President and Joseph Wright spoke in favour of the scheme, and William Gray, M.R.I.A., offered some criticism on the subject of such an alliance, but was in favour of such joint meetings.

F. J. Bigger, Honorary Secretary, in supporting the matter brought forward by R. Ll. Praeger, said it was not contemplated that the individuality of any Club nor their controlling power over their own work should be interfered with in any way, but that a central committee of all the Clubs should be appointed for carrying on general work. The matter would be decided in Committee, but the present opportunity was given to the members of discussing the proposal.

W. H. Patterson, M.R.I.A., also spoke in favour of the scheme.

Mrs. M'Alery, Rev. W. J. Christie, M.A., James Quinn, and James M. Bradshaw were then elected members of the Club.

27 November, 1894.

A Special Meeting of the Club was held on Monday evening, 27 November, in the Museum, when a lecture was delivered under the auspices of the Celtic Class by Douglas Hyde, LL.D., T.C.D., upon "The Celtic Language and Literature." There was a large and interested audience, who listened to Dr. Hyde with rapt attention for over an hour and a half.

The President introduced the lecturer.

Dr. Hyde fully reviewed the work of the last three centuries of Celtic poetry and romance, bringing into prominence and colouring with a vivid glow the different literary efforts of a struggling people—a race contending for the survival of their language against odds rarely equalled in the history of nations. The lecture contained copious quotations, some of which were translated by Dr. Hyde, and others delivered in the native tongue, in which many quaint stories and curious ballads were introduced. Frequent bursts of applause greeted the lecturer at the salient and passionate parts of his address. In concluding, Dr. Hyde urged all those present to study the Irish language, and thus preserve to the race one of the most cherished heritages. An opportunity was now afforded them of doing so, and if such was allowed to pass at the present time the most valuable of all the living Aryan languages of Europe would be lost for ever, to the eternal disgrace of our common country, and (he added) the learned professors of the future in their philological researches would quarrel over its bones.

P. J. O'Shea, the conductor of the Celtic class, moved a vote of thanks to Dr. Hyde, which was seconded by J. M'Ginley, both in the Irish language. Dr. St. Clair Boyd and W. Gray, M.R.I.A., also supported the resolution, both agreeing that the

lecturer had afforded the Field Club such a treat as had scarcely ever been enjoyed within the old Museum walls. The resolution was passed in an enthusiastic way.

18 December, 1894.

The third winter meeting was held in the Museum on Tuesday evening, 18 December—the President, F. W. Lockwood, C.E., in the chair—when the evening was devoted to geological papers by the members. The following “Notes on Moel Tryfaen” was contributed by Miss Mary K. Andrews:—

Moel Tryfaen is an outlier of Snowdon, situated five miles south-east from Carnarvon, and about five miles in a direct line east from the sea. It is a hill of rounded form, largely covered with drift deposits, while on the top great masses of Cambrian conglomerate stand out, giving it a characteristic castellated appearance. The high-level “shell-bed” by which it has attained world-wide celebrity is quite 1,350 feet above the level of the sea. It was first discovered by Joshua Trimmer, and described in a letter addressed by him to Dean Buckland, read before the Geological Society on the 8th of June, 1831. From this letter it appears that near the summit of Moel Tryfaen, in a boring made through sand and gravel in search of slate, at about twenty feet below the surface, Joshua Trimmer found marine shells in a bed of sand, for the most part broken, resembling the broken shells on the adjacent beach. The fragments he considered to include *Buccinum*, *Venus*, *Natica*, and *Turbo*. This latter S. A. Stewart identifies as *Trochus*. Joshua Trimmer also observed that, when the surface of the slate rock is newly laid bare, it is found to be covered with scratches, furrows, and dressings, and refers these to the action of diluvial currents, which overspread the country with gravel. From this date Moel Tryfaen occupies a foremost place in geological history, its shells have been carefully enumerated, and its deposits examined with care, while the mode of their

occurrence has given rise to conflicting theories, and left problems of interest and difficulty still to solve.

The Alexandra Slate Quarry, in which the shell-bearing deposits are well exposed, lies in an east by south direction, about three hundred feet from the conglomerate at the top of Moel Tryfaen. The deposits form a thick series of sands and gravels, occupying nearly a quarter of a mile in linear extent, and having an average depth of from nine to twelve feet, with occasional exposures fifteen feet deep. They exhibit both stratification and current bedding. Extending originally over the whole top of the quarry, much of these deposits is now cleared away, but, as excavations extend, fresh surfaces come to light, and till the vexed question of Moel Tryfaen, the acknowledged crux of geologists, is satisfactorily explained, I think steps should be taken to secure, in the interests of science, the preservation of as much of their shell fauna as possible.

In the section as shewn in the diagram, kindly made by Miss Sydney Thompson from a small photograph taken last August, you will observe boulder clay averaging about ten feet in depth, overlying a deposit of sand and gravel of rather greater thickness. The sand immediately under the boulder clay is very fine; the shells on the table were found in a layer of coarse sand and gravel, from one to two feet in thickness, near the figure in the diagram, who is pointing to the spot where one of the turritellas was actually found. Below this part of the section, a layer of soft clay intervenes before you come to the slate beneath. In other parts of the quarry, especially towards the south-east, from nine to twelve feet of fine sand is found between the top of the slate and the surface of the ground. The edge of the slate rock sometimes presents a bent and shattered appearance. The shells and shell fragments are fairly numerous, mostly water-worn, the most perfect being generally those that, as pointed out by Mellard Reade, are of a form most calculated to resist pressure. Besides British types, these deposits have yielded Arctic and Scandinavian species. I am sorry I have no Arctic forms to show

you. S. A. Stewart, F.B.S.E., most kindly examined the shells and shell fragments on the table, and enumerates the following species :—*Turritella terebra*, *Tellina balthica*, *Mactra solida*, *Astarte sulcata*, *Astarte compressa* ; all, he informs me, have a northern facies, but none are decidedly Arctic.

I regret the collection is so small, but I think the proportion of almost perfect shells to fragmentary is satisfactory, and shows we are dealing with a veritable shell-bed, although its right to be regarded as such has been questioned.*

The microscopic examination of the sand and gravel is highly interesting : for this I am deeply indebted to Joseph Wright, F.G.S. He finds foraminifera in both, but the gravel is much richer in these rhizopods than the sand. In seven ounces of sand he found only eight specimens of foraminifera, but these include one very rare species, *Pulvinulina karsteni*. In only five ounces of gravel he found twenty-four specimens, that of *Lagena squamosa* being particularly large.

A complete list of these foraminifera is appended to this paper. Joseph Wright has made microscopic slides of them, and these, by his kind permission, will be exhibited at the meeting of the Microscopic section next Thursday.

Although I have not read the whole bibliography of Moel Tryfaen, this is, so far as I am aware, the first time that this interesting bed, so often searched for larger shells, has revealed its microscopic forms.

Mellard Reade has submitted the drift of Moel Tryfaen and of the Carnarvonshire area to mechanical analysis, and finds the sand of Moel Tryfaen to consist largely of quartz grains, greatly rounded and polished, such grains being almost universally marine. The stones found in the sands and gravels are often water-worn. They are to a certain extent of local origin, but erratics from Cumberland, Galloway, Ailsa Craig, and

* A few were collected by myself during a very short visit on the 17th of last August, the larger number were sent to me last week by Mr. Hughes, assistant manager of the Alexandra Quarry, and are the result also of one short search. I have further to thank Mr. Hughes for specimens of the deposit in which they were found, and for several details regarding the beds exposed in the quarry.

Antrim have been recorded. A few I picked up at random are on the table, amongst them you will find granite from Eskdale, quartz-porphry with riebeckite from Mynydd Mawr, Welsh ophitic diabase, and a granitoid rock, probably Welsh Archæan. For the sources of these I am indebted to Percy F. Kendall, F.G.S. Thus the marine origin of these shelly sands and gravels, sections of which have been found on Moel Tryfaen from 1,170 to nearly 1,400 feet above the level of the sea, seems undoubted. 1st. We have the shells and shell fragments. 2nd. The foraminifera. 3rd. The extremely rounded and polished grains of sand. 4th. The water-worn foreign boulders. But the question how have they been deposited in this unique position is one over which many contests have been fought in the past, and which conflicting theories still assail in the present.

Joshua Trimmer, in accordance with the views of his time, brought in diluvial currents as the explanation. Darwin, eleven years later, recognised in the shattered and contorted slate rock the effects of icebergs grating over the surface. The late Sir Andrew Ramsay also attributed much of the glacial phenomena of the district to floating ice, and from the consideration of this high-level shell-bed and those of Macclesfield and Ffridd Brynmawr, likewise associated with glacial material, he inferred a submergence of the land to a depth of not less than from 1,200 to 1,500 feet. In corroboration of this depth, he cited the high-level, shell-bearing Pleistocene gravels of Three Rock Mountain, near Dublin, ground rendered classic through the researches of a geologist we all revere, the Rev. Maxwell Close.

A newer school of glacial geologists has since arisen who, while admitting a submergence of 100 to 150 feet, maintain that the glacial deposits of Great Britain are the results of glaciers or ice-sheets, and that wherever marine shells occur in such deposits at high levels it can be proved from other evidence that the ice advanced upon the land from the sea. Some of the contents of the beds would thus be the relics of great shell

banks in the Irish Sea, incorporated in the ground moraine of the "Irish Sea Glacier." To this school the diluvial hypothesis is more consonant than the "great submergence" theory. "I believe," writes Professor Carvill Lewis, "that British geology would be much further advanced if, when Mr. Trimmer announced his discovery of shells on Moel Tryfaen, his theory had been accepted instead of that of a marine submergence. . . .

When England is once and for ever free of it the Drift will no longer be a bye-word and a synonym for confusion and helplessness, but will take its rank among the orderly strata of the earth's crust. That once accomplished, post-pliocene deposits will become of the highest interest as having the most direct bearing on the advent of the human race." We must all feel with Professor Carvill Lewis that deposits which bring us to the dawn of the human era have a special interest, but in the light of recent evidence, perhaps we may wish to pause before relinquishing the older theory of "submergence."

It would be presumptuous in me to offer any opinion. Great workers on both sides have done noble work in the interest of truth alone. Comparative observations are increasing rapidly, and, when all these are marshalled in order, I trust some simple generalization may be discovered, so widespread in its bearing as to include satisfactorily even the capricious, high-level shell-bed of Moel Tryfaen "among the orderly strata of the earth's crust."

LIST OF FORAMINIFERA

From "Shell-bed," Moel Tryfaen. Determined by
Joseph Wright, F.G.S.

1. Sand, weight 7oz. Foraminifera, 8 specimens.
Cassidulina crassa, d'Orb., 2 specimens.
Pulvinulina Karsteni (Rss.), 1 specimen.
Nonionina depressula (W. & J.), 3 specimens.
2 specimens too much broken to identify.
2. Gravel, weight 5oz. Foraminifera, 24 specimens.
Miliolina Sp., 1 specimen, very small.

Verneuilina polystropha (Rss.), 1 specimen, very small.

Bolwina plicata, d'Orb., 2 specimens.

Cassidulina crassa, d'Orb., 2 specimens.

Lagena squamosa (Mont.), 1 specimen, large.

Discorbina rosacea, d'Orb., 1 specimen.

Truncatulina lobatula (W. & J.) 5 specimens, very small.

Nonionina depressula (W. & J.), 9 specimens.

N. pauperata (Balkwill & Wright), 1 specimen.

Folystomella striato punctata (F. & M.), 1 specimen.

The next paper was entitled :—"A Bit of Foreshore," by Miss Sydney M. Thompson, Hon. Sec. of the Geological Section.

"Every dog has his day," says the old proverb ; and so has every hobby ! About thirty years ago the favourite and fashionable hobby was an aquarium, to which I was a faithful devotee. Consequently, for many years I was as familiar with every yard of the shore opposite Macedon as with the garden. The very remarkable amount of erosion that has taken place within my memory, and the consequent series of rapid changes that have occurred along the stretch of shore surrounding Macedon Point seem well worth recording. Should the next quarter of a century deal as severely with the well-known cross-dykes at the Point as the last quarter has, I fear the next generation will know them only as a memory, rescued from complete oblivion by the maps of the Geological Survey, by Miss M. K. Andrews in last May's *Irish Naturalist*, and the various photographs taken by members of our club.

Some who are present will be interested to know that when I first kept an aquarium my uncle's old friend and fellow-worker, the late George C. Hyndman, was still alive, and kindly lent me many books upon the subject. He even promised in a rash moment of sympathy to take me out dredging with him, and it can be readily imagined with what keen impatience I looked forward to such a delightful prospect, but alas ! it was never realized ! Perhaps it occurred to him that a small enthusiast in petticoats would be an embarrassing addition to a scientific

cruise, or perhaps no fit opportunity offered, but to this day my desire to go dredging remains unsatisfied.

Geologically speaking, the portion of shore to which I shall refer consists of the Trias, which only occurs in this north-eastern corner of our island, extending southward as far as County Louth, and is situated underneath the beds about which we are to hear from William Gray this evening. The beds opposite Macedon are the Keuper marls, both red and green, whilst further towards Whiteabbey we come upon almost vertical layers of red and yellow sandstone. Innumerable basaltic dykes have forced their way from beneath, sometimes filling irregular cracks, many feet wide, with wall-like masses, at other times barely lifting the shaly layers to ooze out in gentler flows. In the cross-dykes two separate flows intersect one another, as is shown upon the diagram on the wall. The junction is so much eroded that their relative age is rather obscure, but as far as I can judge the dyke marked B C is the older. During our amphibious childhood my brother and I spent a large part of every summer boating along our coast, and I well remember the delightful excitement when our small punt ran aground, even at full tide, on those familiar cross-reefs, and threatened to tilt us over into the water. In those days there were but two gaps where the passage could be safely attempted, but now the old black walls are so worn away that a much larger boat could cross almost anywhere at high tide. In fact, I am deliberately inclined to put the erosion of the last 30 years as being certainly not less than 18 or 20 inches. Our gardener, who has known this part of the shore longer than I have, quite agrees with me in this estimate, and tells me that Mr. Joynt, who lived in Whitehouse during the period I refer to, told him that he recollected them very much higher still. Why these dykes that had evidently withstood the waves that cut away the softer Triassic rocks during the first half of the century and then remained above the general plane of the shore like walls, should latterly have yielded so comparatively rapidly to the action of the sea

that they are likely soon to be flush with the rest of the shore, it would be hard to say, but the other changes that have occurred seem to indicate a greater increase in the scour of the tides. In fact, the shore is no longer predominantly sandy.

Although not strictly belonging to my subject to-night, it is worth taking a retrospective glance at earlier changes along the shore nearer Belfast. Before the Northern Counties Railway was made, the sea came quite up to the Shore Road, and basaltic stone was quarried near Fortwilliam and also close to the present Greencastle station. The railway embankment was partly constructed from materials taken off the shore, where huge holes were left, many feet in depth, and frequented by large eels. There was a mussel-bed accessible when the tide was out, between the present Whitehouse and Greencastle stations, with a great number of scattered boulders, 3 or 4 feet high, where boys used to play hide and seek. When the late John Thomson, of Low Wood, made what is known as "Thomson's Cut," leading to the basin at Whitehouse Coast-guard Station, to enable boats from his yacht to obtain access to the shore at all states of the tide, these boulders were blasted, and used to form the long pier that runs out beside the "cut." More recently shingle and sand have been deposited near Whitehouse station; and there are now vast spaces of sand nearer town, where I have sometimes, upon a holiday, counted between 30 and 40 people gathering cockles. These districts, within the period I refer to, were soft mud, quite impassable, unless the travellers were provided with large flat boards attached to their feet.

About the year 1862 the Government took over the foreshore, and granted leases of it to those whose property ran along the coast. Much damage to the foundations of sea walls had resulted from the operations of so-called "freestone gatherers" and from the amount of sand carried off the shore by lighters. I remember seeing two or three men and women opposite Macedon diligently occupied during low tide in digging and breaking up the green "freestone" or marl, and tramping off

to Belfast with heavy bags on their back, to sell for scouring tables and floors. There is scarcely any green left; they never took the red. The lightermen used to come down at high tide and anchor, load up with sand when the tide went out, and pole the lighters up to Belfast at the next high tide. The leases gave the holders power to forbid such excavations inside half-tide mark.

To realize the extent of these changes, let me picture to you our shore as it *was* and as it now *is*. Glancing at the diagram, we see Macedon point, which is in reality a solid boss of basalt, about 8 or 10 feet high, forming the base of the triangle A, which is enclosed by the two inner arms of the cross-reefs. In old days this triangle of shore not only stood at a considerably higher level than the shore outside, thanks to the protection afforded to it by the reefs, but also contained a deep deposit of tolerably firm mud, in which were many pools of water, thickly fringed with grass-wrack (*Zostera marina*), frequented by pipefish (*Syngnathi*); and, I remember vividly, that these pools were so deep that the fish could not be captured without wetting the sleeves. This gives a kind of rough estimate of the depth of the pools. It was the only spot on my special "bit of foreshore" where the grass-wrack flourished. *Now* the protecting walls of basalt are broken down—mud, grass-wrack, and pipefish have vanished, and the triangle is an expanse of bare, red marl, devoid of much permanent animal or vegetable life. This bare, scoured surface prevails over long stretches of the shore that were formerly covered with a deep coating of sand, full of lobworms, cockles, and *Terebellæ*, and used to be dotted with long, shallow pools, plentifully furnished with sea-grass (*Enteromorpha compressa*) and green laver (*Ulva latissima*). The bladder wrack (*Fucus vesiculosus*) confines itself chiefly to the reefs of basalt, giving valuable warning of their presence even at high tide. General Bland tells me that opposite Woodbank (nearer to Whiteabbey) he has been struck by the same exposure of marl where formerly sand about two feet deep prevailed, and mentions that great banks of mud have

vanished from that district, but thinks they may possibly have been deposited further out, where the sea now apparently breaks upon an obstacle where formerly none existed.

Another noticeable change opposite Macedon is the extension inland of the Laminarian Zone. Reflecting upon the general results of the changes I have chronicled, I doubt very much if the old variety of animal life could now be found upon our shore, and one can see how rapidly a small amount of geological change may become a powerful factor in the local distribution of plants and animals.

And now the latest occurrence to record is a change in distribution, but in this case it is the hand of man, not the slower process of geological change, that is responsible. Two years ago I noticed for the first time a fine blue colour over the rocks, such as we often see depicted in Hook's charming sea pieces, caused by the presence of innumerable baby mussels (*Mytilus edulis*), securely anchored to the reefs, and this year many square yards of shore are thickly covered with almost full-grown specimens. In my early days it was quite a rare thing to find a stray living mussel, but their sudden appearance on our side of the Lough is explained in a very interesting paper by R. Lloyd Patterson, F.L.S., in last June's issue of *The Irish Naturalist*.

The papers were spoken of favourably by William Swanston, F.G.S.; William Gray, M.R.I.A.; John Hamilton, and Alex. G. Wilson.

V. m. Gray, M.R.I.A., then made a short report of the club delegates to the British Association at Oxford, when the club was awarded the thanks of the association for their invaluable contributions of photographs illustrating the geology of our district.

In pursuance of the recommendation of the British Association, W. Gray proposed, and R. J. Welch seconded, the following resolution, which was unanimously passed:—"That the Belfast Naturalists' Field Club should place themselves in communication with the Belfast Corporation with a view to

extending scientific knowledge by means of lectures and demonstrations in our museums."

W. Gray, M.R.I.A., then proceeded with his lecture on the "Missing Beds of Cave Hill," using the geological features of Portland as apt illustrations. The lecture was well illustrated with lantern slides and diagrams, shown by W. Nicholl, the different organic remains being represented by a fine series of fossils on the table, which were afterwards inspected by those present.

The President, the Honorary Secretary, and W. Swanston having complimented the lecturer on his admirable paper, the following new members were elected:—Miss Josephine Buchanan, M.A.; Rev. Douglas Walmsley, B.A.; Geo. Smith, and Miss E. Corley.

14 *January*, 1895.

A meeting was held on Tuesday evening, 14 January, in the Museum. There was a large attendance. The President, F. W. Lockwood, C.E., called upon Joseph Wright, F.G.S., to contribute his note upon "The Occurrence of Boulder Clay on Divis."

Mr. Wright stated that a few weeks ago he had visited Divis Mountain in company with S. A. Stewart to examine boulder clay which he had observed high up on the mountain, and exposed in section by the side of a mountain stream. Two gatherings of this clay (about 10lb. weight) were made at the height of about 1,300 and 1,400 feet respectively above the sea. These, on being microscopically examined, were found to contain two fry of mollusca—viz., *Buccinum undatum*, the other doubtfully referable to *Littorina littoralis*, also a foraminifer, *Nonionina depressula*, and six ostracoda, too young to name with certainty. Through the courtesy of W. Gray he had also received a few pounds weight of boulder clay from Wolf-hill, 800 feet above the sea. In this sample were found three

specimens of *Nonionina depressula*. These discoveries are of interest on account of the great height at which the clay occurs and of the marine organisms found in it ; foraminifera and ostracoda have not hitherto been recorded from boulder clay at such high elevations. Some discussion ensued, in which William Gray, M.R.I.A. ; Wm. Swanston, F.G.S. ; J. Templeton, and others took part.

The President then called upon Professor A. C. Haddon, M.R.I.A., of the Royal College of Science, Dublin, to deliver his lecture upon "Modern Relics of Olden Time."

Professor Haddon said that the object of his lecture was to illustrate some of the stages in the evolution of human industries and customs. As ready means of communication and transport were very important for the progress of culture, he would commence with means of transport. Photographs of the human burden bearer in Ireland and New Guinea were thrown on the screen ; these were followed by illustrations of panniers on beasts of burden and by a very interesting series of vehicles, commencing with the slide or sledge car of the North of Antrim, which consists essentially of two poles trailing on the ground. These simple contrivances were formerly used in Scotland and Wales, and a slide was exhibited showing their employment by the North American Indians. The various stages in the evolution of the block-wheel car into carts with spoked wheels were illustrated by beautiful photographs taken by Mr. Welch. Transport by water next claimed attention, and the canoes of Donegal and of the West of Ireland were compared with those made by natives in the Pacific Ocean, and these were followed by the rude rounded curragh, still in use on the Boyne, made of wicker work covered with cowhide and propelled by a spade-like paddle. Domestic industries were illustrated by spinning, and photographs of various kinds of Irish spinning-wheels were shown ; of these there are two types. Irish and Scottish querns or mill stones were also described.

The lecturer pointed out the importance of dancing amongst

savages, and how it enters very largely into their religion. Different kinds of savage dances were described, more particularly the initiation ceremonies. This led to a description of the bull-roarer, and two specimens of this ancient and sacred instrument were exhibited and swung; the one was obtained by the lecturer in Torres Straits, the other came from England. Some Papuan death dances were described, the performers of which are covered with leaves and wear leafy masks. These were followed by representations of the costume of the Irish "straw-boys," and the parallelism between the two was startling. The significance of a certain class of children's games was dealt with, and it was shown that many of these illustrate the customs of our heathen ancestors, some being marriage games, others being funeral ceremonies, others again being reminiscences of well-worship. Some photographs of holy wells and the offerings at them were next shown, and lastly a fairy thorn at Holywood. Professor Haddon emphasised the facts that these were not trivial subjects, and that only by studying the customs of the folk and children's games and the like was it possible to form some idea as to the religious beliefs and practices of our ancestors. He also urged on his hearers to collect and record all such matters. Soon it would be too late, but now and now only was the time to collect.

The lecture was fully illustrated by a representative series of slides of Irish and foreign subjects, the lantern being worked by R. Welch. W. H. Patterson, M.R.I.A.; Wm. Gray, M.R.I.A.; Richard Patterson, J.P.; and R. Welch having spoken—the wish being expressed that Professor Haddon would deliver a course of lectures next session under the auspices of the Club—the President conveyed to the lecturer the best thanks of the Club. The following new members were then elected:—Miss M'Cutcheon, B.A.; J. M'Clelland Martin, W. J. Stewart, and Charles J. Lanyon.

19 *February*, 1895.

A lecture was delivered in the Museum by the Rev. Denis Murphy, S.J., LL.D., M.R.I.A., Vice President R.S.A. The subject chosen was "Irish Art as Shown on Ancient Crosses." The lecture was illustrated by a complete series of slides giving beautiful representations of all the known Irish Crosses. Several of those most admired were executed by R. Welch, of Belfast. There was a large attendance.

F. W. Lockwood, President, occupied the chair, and, in introducing Rev. Dr. Murphy, said he thought he could promise the audience a rich treat, and he was sure they would all join him in welcoming down to Belfast such an eminent antiquary as the Rev. Father Murphy. The subject was one of interest, and, although it did not come within the natural history section of their work, it came within the antiquarian section, which some of them were anxious to keep well to the front, especially their honorary secretary. The ancient crosses would tell them some things which the churches and towers could not tell. He had great pleasure in introducing the Rev. Dr. Murphy.

The Lecturer, in introducing the subject, said he was extremely thankful for the kind words and for the welcome with which he had been greeted. He hoped they would not consider him uncharitable if he supposed there might be some amongst them who did not know what were the special characteristics of Irish art, and he would mention some of them as a kind of introduction to our Crosses, and would at the same time set before them a few specimens, but only a few specimens, of the art called Irish art. Some might ask was there such a thing as Irish art. He, of course, asserted that there was; and the fact was now universally admitted by all persons acquainted with such matters. He called it "Irish art," and not Celtic art, as some people called it. It was peculiarly Irish, and should be called Irish, not Celtic. As they all knew, Celts were to be found in Ireland, Scotland, Britain, Wales, and Cornwall; but he would ask anyone at all acquainted with the history of this kind of art

to show, with the exception of Scotland, what Brittany, Wales, or Cornwall had contributed to it. They imitated Irish art, and, as Dr. Anderson, of Edinburgh Museum, said, they had specimens of Celtic art, but a great deal of that art was Irish. With regard to what the characteristics of Irish art were, it should be pointed out that it was what would be called simple with regard to work. That was what might be given as the first origin of Irish art, so to speak, which was afterwards developed into what was called "*opus hibernicum*" and "*opus reticulum*," The first characteristic of it was the absence of leaf ornament—a curious thing. In this form of pure Irish art there was no such thing as leaf ornamentation. There was certainly something like a trefoil, but that was an exceptional thing, and could hardly be spoken of as leaf ornamentation. The second characteristic was its infinite variety. It would be seen that the surfaces of these specimens of Irish art were cut into very small panels, and these were so varied in shape and form that no two of them would be found to be alike; they had then in addition the infinite variety of the patterns in those panels. The third characteristic was the extraordinary detail and elaboration of detail in these kinds of Irish ornaments, which Westwood and other writers stated had especially attracted their attention. A remarkable thing was that in the space of three-quarters to half an inch there was to be counted 158 lines—all within that narrow space—not simply parallel, but crossing each other in interlaced work; and no matter how magnified by modern appliances, it would be seen that in the superior kind of Irish art there would not be a single line missing. It had been said at times that this Irish system of ornamentation came to Ireland from Byzantium and Dr. Rock in a work of his said it came to Ireland from England and that England used to send over beautiful manuscripts, which the Irish could not use, stupid people that they were. That book was published forty years ago, and it was to be hoped that the editor of the new edition would change all that, because it was very false. Westwood, speaking of the Book of Kells, stated that he counted in

a space measuring three-fourths of an inch to half an inch no fewer than 158 interlacings of slender ribbon pattern, formed of white lines edged with black ones, and that he examined the pages for hours together without detecting a false line or an irregular interlacing. Some of the finest of the Irish art work came from a very early period. The Book of Kells was supposed to have been written by St. Columba, but it might, with absolute certainty, be ascribed to the seventh century. Another specially beautiful class of ornament was what was called the "trumpet ornament," which was said to be the most beautiful style of ornament which we have—beautiful not only in the richness of its design, but in the depth and intensity of the shadow it throws. He would give an illustration of a beautiful example of one of those ornaments which was in the Museum in Dublin, and which was undoubtedly Irish. He had seen it catalogued British in the British Museum, but he would rather say it was Irish.

Beautiful illustrations were then thrown on the screen, showing first the initial letter of the first page of the Book of Kells, the exquisite and wonderful tracery and ornamentation of which was greatly admired by all present. This wonderful work, the lecturer explained, was carried from the Island of Iona for safety to Kells, when the sanctuary of St. Columba was ravaged by the Danes. Hence the origin of the title. An illustration was next shown of the Tara Brooch and one of the Ardagh Cup, an ancient chalice, which was found in the western part of County Limerick by a young lad when digging. Illustrations were also shown of the Shrine of St. Patrick's Bell, supposed to have been made about the year 1100, an account of which had been written by the late lamented Bishop Reeves, and published by Marcus Ward & Co. The famous Lismore Crozier was also shown, and another ancient shrine. The lecturer explained the details of the ornamentation in dealing with each of these famous works of Irish art, and gave a history of them. The subject proper of the evening's lecture was then proceeded with, and the first picture thrown upon the screen was that of the

cross known as the Sletty Cross, one of the earliest and rudest kind. As the lecturer proceeded, the process of development of Irish art was shown very clearly by the specimens of crosses exhibited, commencing with the plain and roughly-hewn crosses until the highest and most ornamental forms were reached in the Crosses of Monasterboice, Kells, Clonmacnoise, and many others. The processional Cross of Cong was also shown and described, and before concluding a beautiful specimen of a modern Irish Cross, worked upon the ancient patterns, was exhibited.

At the conclusion of the lecture,

The President expressed the delight with which, he felt sure, they had all listened to the lecture, and said they were very thankful to the lecturer for having imparted to them a great deal of valuable information.

Wm. Gray, M.R.I.A., also spoke, and referred in terms of admiration to the systematic manner in which the lecturer had shown the development of art in those Crosses.

John Vinycomb, M.R.I.A., as one acquainted more particularly with the subject with which the lecture was commenced—the art of illumination—also spoke on the subject of the lecture.

Seaton F. Milligan, M.R.I.A., next spoke, and drew attention to the danger to which our Irish Crosses are exposed at the hands of tourists.

The following new members were then elected:—August Renold, S. A. Patterson, David Alderdice, and Mrs. Damant.

19 March, 1895.

The fifth meeting of the Session was held on Tuesday evening in the Museum, when the evening was devoted largely to the study of the microscope. The President, F. W. Lockwood, C.E., was in the chair. The following paper on "Hullite," by Grenville A. J. Cole, M.R.I.A., F.G.S., Professor of Geology in the Royal College of Science for Ireland, was then read.

Since the first announcement of hullite as "a hitherto undescribed mineral"* from Carnmoney Hill, Co. Antrim, the substance thus described has been subjected to examination in various quarters. But I venture to think that, familiar as this material is to geologists in the North of Ireland, there is still something to be said concerning its true nature.

E. T. Hardman † describes the "mineral" as "filling amygdaloidal cavities"; Prof. Hull,‡ on the other hand, in his notes, speaks of it as "large and small grains of an opaque, black, dense mineral, with smooth, somewhat conchoidal, fracture, and brown streak," forming part of the "paste" of the basalt. Both these statements are, however, correct, since "hullite" occurs interstitially among the minerals of the rock, as well as in mammillated and minutely stalactitic forms coating the numerous steam-vesicles. I have not been able to verify Prof. Hull's remarks as to the abundant occurrence of olivine in the Carnmoney rock, which, from my own sections, I should regard as being on the verge of the pyroxene-andesites and aphanites, rather than as an olivine-basalt. M. Lacroix records olivine, however, and the mass is clearly variable in mineral composition.

I fail to understand E. T. Hardman's remark that microscopic sections show that "the mineral is perfectly distinct from, and does not merge into any part of, the basalt." Prof. Hull appears very properly to contradict this by his own statement some nine lines lower down; and E. T. Hardman himself observed how the "hullite" was deposited in spaces between the augite and other crystals. Surely in such cases it formed an integral part of the basalt.

His careful analysis is of historic interest, as one of the first cases in which Sonstadt's method of separation, by the use of a

* E. T. Hardman, "On Hullite, a hitherto undescribed mineral; a Hydrous Silicate of peculiar composition, from Carnmoney Hill, Co. Antrim, with Analysis. With Notes on the Microscopical Appearances, by Prof. Hull, F.R.S." Proc. Royal Irish Acad., ser. II, vol. III (1878), p. 161.

† *Ibid*, p. 164.

‡ *Ibid*, p. 166.

heavy liquid, was employed to procure the material from the powdered rock. E. T. Hardman shows that "hullite" differs in composition from delessite and chlorophæite, neither of which substances, by-the-by, have great credit among geologists as well defined mineral species.

Prof. Heddle,* a year later, pointed out that we know too little of chlorophæite, but gave an analysis of a substance from vesicles in basalt at Kinkell, Fifeshire, which he regarded as sufficiently near to the original "hullite" to justify its retention as a mineral. It may be worth while to quote the two analyses side by side.

I.		II.	
"Hullite" of Carnmoney. (Hardman.)		"Hullite" of Spindle of Kinkell, Fifeshire. (Heddle.)	
Silica,	... 39.437	...	38.591
Alumina,	... 10.350	...	17.337
Ferric oxide,	... 20.720	..	15.97
Ferrous oxide,	... 3.699	...	trace.
Manganous oxide,	... trace.	...	1.562
Lime,	... 4.484	...	3.944
Magnesia,	.. 7.474	...	8.646
Potash,	... —	...	.67
Water,	... 13.618	...	13.476
Carbon dioxide,	... trace.	...	—
	<hr/> 99.782	...	<hr/> 100.196

M. A. Lacroix† subsequently examined the "hullite" of Carnmoney in microscopic section, and showed that the translucent brown substance included magnetite and calcite, and, what is far more important, small crystals of felspar of the same species as that which occurs so freely in the main mass of the

* "Chapters on the Mineralogy of Scotland," Trans. Roy. Soc., Edinburgh, vol. XXIX, p. 89.

† "Sur le kirwanite et le hullite," Bulletin Soc. Min. de France, tome VIII (1885), p. 432.

basalt. He notices that certain fibres affect polarised light, in the midst of the generally isotropic material, and concludes that "hullite" is related to "the gummy products to which the decomposition of olivine gives rise."

But this in no way gets over the difficulty of its being again and again an interstitial substance between the rods of felspar and the granules of augite. While it coats the interior of vesicles on the one hand, on the other it plays the part of a true groundwork to the crystalline constituents.

This latter fact is so clear that I have no hesitation in regarding the great mass of what has been styled "hullite" as simply the altered and hydrated glass of the original basaltic ground-mass. Its chemical composition is closely paralleled by the frequently analysed "palagonite," which itself has no longer any position as an independent mineral species. Prof. A. Geikie* long ago showed how fragments of basaltic glass had been altered to green "serpentinous" material in the tuffs of Scotland; while "palagonite" has been also described from the relics of Ordovician volcanoes in Wales.† In such cases the old basaltic glass or tachylyte is altered to a dull soft black substance, while retaining in a wonderful degree its former structures and its relation to the minerals which once developed from it, or which floated in it porphyritically. Under the microscope it is difficult to believe that we are dealing with a substance so highly altered as palagonite; but the polariscope, as, indeed, in some parts of "hullite," often reveals a tufted crystalline structure, which has arisen during the hydration. I‡ have commented on this point recently in the case of a material which is intermediate between tachylyte and "hullite," and which has a hardness, as I now notice, of 4·5.

* "On the Carboniferous Volcanic Rocks of the Basin of the Firth of Forth," Trans. Roy. Soc., Edin., vol. XXIX (1879), p. 515 and pl. XII.

† G. A. J. Cole, "On some additional occurrences of Tachylyte," Quart. Journ. Geol. Soc., London, vol. XLIV (1888), p. 306.

‡ "On Variolite and other Tachylytes at Dunmore Head, Co. Down," Geol. Mag., 1894, p. 222.

I believe, then, that the striking resemblance of typical "hullite" to lumps of tachylyte (or "pitchstone" and "obsidian" of older authors) is by no means accidental; the material is a basic glass that has become soft and "gummy" by alteration. Mr. Hardman's* comments on those who had "mistaken" it for a glassy substance may, I think, be set aside; but it must be remembered that, when he wrote, palagonite and tachylyte had been little studied in our islands.

In two sections from Carnmoney, which are in the collection of the Royal College of Science for Ireland, the brown "hullite" can be seen entering the corroded felspar crystals and playing precisely the part of an original glassy groundmass. Comparison is possible, moreover, with the paler and unaltered glass which occurs interstitially in some parts of one of the sections. The black groups of crystallites of magnetite in the glass are not, however, present in the altered product, and probably the warm brown colour of sections of "hullite" is original, owing to the presence of widely diffused ferric compounds. Where separation of the materials occurred, as in the paler areas, the glass became more stable; and the soft palagonitic condition arose, as usual, most completely in the undifferentiated portions.

The black material lining the steam-cavities of the Carnmoney basalt certainly seems the same as that which forms the tachylytic blebs throughout the rock. But its stalactitic and encrusting form in no way prevents us from regarding it as also originally a glass. On a minute scale, it forms a reproduction of the lava-stalactites in the caverns of the Hawaiian flows; the glassy matrix of the lava has oozed out under pressure into any cavities it could find. Mr. Teall† has already shown how amygdaloids of this kind may be produced, in which the steam-vesicles have become converted into spherical lumps of glass, looking curiously at variance with the far more crystalline material of the andesitic or basaltic meshwork round them.

* Work quoted, p. 161.

† "On the Amygdaloids of the Tynemouth Dyke," *Geol. Mag.*, 1889, p. 481.

The next paper was a continuation of a paper given last Session by Lieutenant-Colonel Partridge on "The Lepidoptera of Enniskillen"; and the third was a very interesting and valuable paper by J. R. P. Masefield on "Wild Bird Protection and Nesting Boxes," giving full details as to the construction and arrangement of artificial birds' nests in our gardens to encourage rare birds to build in the immediate vicinity of our homes.

The best thanks of the Club were given to these gentlemen for their valuable contributions.

Joseph Wright, F.G.S., in speaking favourably of the papers, referred to his recent visit as the delegate of the Club to Dublin, Cork, and Limerick, under the auspices of the Irish Field Club Union, whereby a closer bond of union between Irish naturalists was being brought about.

The following is a list of those who showed microscopes with their exhibits :—Miss C. M. Patterson, living forms, showing the circulation of blood in a frog's foot; Miss M. K. Andrews, albite; Miss S. M. Thompson, various; Wm. Swanston, F.G.S., sertularians and graptolites; Joseph Wright, F.G.S., foraminifera from boulder clay; P. F. Gulbransen, zoophytes; W. D. Donnan, M.D., pathological and bacteriological sections; W. A. Firth, selected diatoms from Damara (New Zealand), Panama, and Lough Mourne; J. O. Campbell, B.E., chemical subject under polarised light; R. Welch, miscellaneous; and A. Hamilton, American beetle.

At nine o'clock a short business meeting was held, when Rev. John Andrew was elected President of the Microscopical Section, much regret being expressed at the retirement of Alexander Tate, C.E. Dr. Donnan was elected Secretary of the Section.

The following were elected members of the Club :—J. L. Macassey, J. St. J. Philips, B.E.; Henry S. Anderson, George Gilmore, A. Milligan, Andrew S. Oswald, jun.; Rev. F. W. Davis, W. W. Dickson, Dr. Wilson, Rev. John Andrew, Miss Mary Campbell, and Miss Annie Campbell.

28 *March*, 1895.

This evening an entertainment of Irish music and readings was given in the large hall of the Y.M.C.A., Wellington Place, and, though the weather was of the most wintry character, there was a very large audience. J. St. Clair Boyd, M.D., one of the conductors of the Celtic Class, read the following report:—

In presenting the third annual report of our Celtic Class, I have to record an increasing interest in the study of Irish and an increase in the number of our students. The members have this year been divided into an elementary and an advanced class. The former meets in the Club's rooms on Monday evenings, at 7-30, and has been under the care of George Gibson and myself; our average attendance at this class is 16, one-third being ladies, and to give an idea of the people who study with us, I may say that the class includes doctors of law and of medicine, clergymen, teachers, students, a number of officers from H.M.'s Customs, etc., etc. The elementary class has this year had the advantage of Professor O'Growney's "Simple Lessons in Irish," which is superior to anything heretofore published for beginners; we have read the 1st Book of these, and, in addition, have finished reading the 1st and 2nd Books published by the "Society for the Preservation of the Irish Language." The advanced class meets after the other at 8-30, and is conducted by P. J. O'Shea; it numbers about 7, all fluent speakers of Irish, in addition to the 16 from the elementary class, who invariably remain for it. Our largest attendance for the Session of our combined classes was 33—the advanced class read Keating's History of Ireland, and did exercises and conversation. I may here say that the study of Irish has been most interesting and fascinating for us all, and that we fully appreciate the kindness of our Irish-speaking members who assist and encourage us in acquiring this fine old tongue.

I am sure P. J. O'Shea must feel proud of the success of this movement which he originated in connection with the B.N.F.C., and we are all delighted at the great impetus which

Irish has received within the past three years from the work of Dr. Douglas Hyde, Professor O'Growney, and others. We have to record the death of one of the staunchest friends of the Irish language, the Rev. E. D. Cleaver, who spent hundreds of pounds in trying to revive it, and who, himself a Protestant clergyman, published and circulated at his own expense hundreds of R.C. Prayer Books in the Irish language among our Gaelic-speaking fellow-countrymen. Should any care to commence the study of Irish they will be welcome in our class, or if unable to attend it I shall be glad to recommend the necessary books, etc. It is hoped that the class may continue to meet at least once a month during the summer.

I am proud to say that the names of 2 or 3 of our members appear as regular contributors to the "Gaelic Journal."

O'n g-cuid daoine ag a bh-fuil ar d-teanga f'ain impuighim
maitheamhnas nach l'eighear a Gaedhilge an tuaraisg i so.

The annexed slip is a copy of the evening's programme.

ANNUAL MEETING.

The thirty-second Annual Meeting of the Club was held in the Museum on the 9 April—the President in the chair.

The Secretary (F. J. Bigger) read the report of the year's work (see page 159).

W. H. Phillips, Hon. Treasurer, read the statement of accounts (see page 164), which show a gratifying improvement on last year.

These two items were passed unanimously, and the business of electing office-bearers for the ensuing year was proceeded with.

On the motion of Dr. J. St. Clair Boyd, seconded by James Turner, F. W. Lockwood, C.E., was re-elected President by acclamation. Lavens M. Ewart, J.P., M.R.I.A., was re-elected Vice-President, on the motion of W. J. Fennell, seconded by L. Bell. The important post of Treasurer was once more filled by W. H. Phillips, on the motion of the Hon. Sec., seconded

by W. Swanston. W. Gray proposed, and Joseph Wright seconded, the re-election of F. J. Bigger as Secretary, and the election of Alec. G. Wilson as Joint Secretary. W. Swanston was re-elected Librarian. The Committee was re-elected, on the motion of W. H. Phillips, seconded by Alec. G. Wilson.

W. Swanston proposed, and Dr. Boyd seconded, the creation of an entrance fee of 5s, in addition to the annual subscription, both to be paid on nomination. After full discussion, in which Wm. Gray, Jos. Wright, R. J. Welch, and the Secretaries took part, this alteration to the rules was unanimously agreed to.

The reports of the Geological Committee (given below), the Celtic Class (see page 227), the Field Club Union, and of the ladies providing tea were marked "read."

The following were then elected members :—Miss M. Connell, J. B. Moore, M.B. ; Miss Sinclair, Dr. J. MacCormac, Dr. Richard Purdon, W. H. Parker, William Slarer, T. G. Perry.

REPORT OF THE GEOLOGICAL COMMITTEE.

Compiled by SYDNEY M. THOMPSON, *Hon. Sec.*

In reporting upon work done by the geological section during the second year of its existence, we will deal first with the investigations into the glacial geology of the district that have been continued since last year. Having shown somewhat fully in the report for that year the system upon which the work is conducted, we propose to give only a summary of results achieved, reserving lists of fossils, rocks, &c., for publication from time to time, as may seem desirable.

Printed query forms (for post-pliocene geology) have been prepared, and can be obtained from the Secretary, to whom they are to be returned when filled up. These papers will be carefully preserved, and can be seen by anyone wishing to know more details than are given in our annual reports.

The most interesting find we have to record is S. A. Stewart's discovery of fossiliferous boulder clay at heights of 1300 and 1400 feet O.D. on Divis Mountain. Joseph Wright examined the clay, which yielded 2 fry of mollusca, a foraminifer and some ostracoda. Last year's report recorded the occurrence of foraminifera in boulder clay on Carnmoney Hill at 450 feet, and in pursuance of the agreement that investigators should when possible work from Belfast Lough along the valley of the Lagan, beginning at high levels and working downwards, we can now (in addition to the Divis district) record fossiliferous boulder clay from 800 feet at Wolfhill and 400 feet at Woodburn. The prevalence of foraminifera in our boulder clay is interesting, and they seem to occur whenever it is of a type to preserve them from percolating water or other destructive agents. In some cases, however, such as Neill's Hill, they occur in sand also, but the difference in the number contained in the sandy and clayey layers was striking.

Equally interesting and significant is the occurrence all along our coast line of the well-known Ailsa Craig eurite with crystals of a rare blue hornblende. From this small radiant point we find fragments distributed westward on Fair Head, and over an area extending in Ireland as far south as Greystones, in County Wicklow; in Wales, and as far east in England as Macclesfield; and thickly strewn on the north coast of the Isle of Man. Last summer a fragment of pitchstone was found at Island Hill, near Comber, which may either be from the Island of Arran or from veins in the granite of County Down. The occurrence and recording of transmarine stones is specially interesting and important; nor should we omit to mention that Mr. Kendall had predicted their probable occurrence in our drift. We may remark in passing that he visited our district during the year, and picked out of the boulder clay on Scrabo an erratic of nodular basalt with which he was familiar in English drift, and, subsequently, on visiting Slemish, he identified the same rock upon its slopes.

The Mourne water supply scheme promises to afford a

splendid field for work in quite a new district. Already some clay from borings made near Colligan Bridge, on the Kilkeel River, was found extremely rich in foraminifera, so when sections are cut, important results may be obtained. We have to thank the Water Commissioners for promises of facilities for obtaining information.

The list of large erratics and other details are given later in this report. The unusually severe and wet weather of last summer and this spring interfered with field work, eight expeditions having been hindered by heavy rain.

Since the visit of the North Staffordshire Field Club to Belfast last year, their President, Dr. Wheelton Hind, F.G.S., of Stoke-on-Trent, has written expressing a hope that our geological section may be induced at some future time to visit them and inspect their coal measures.

An important meeting was held in the Museum in winter to consider how best to utilise the new rooms acquired by the Club. It was decided to make as complete a collection of rocks that occur in Down and Antrim as possible, carefully marking the localities. Members are requested to assist in this work by contributing specimens, and, if possible, by giving microscopic sections also. Wm. Swanston has already contributed 98 specimens, and other members have also sent in some. It is hoped that members will bear this in mind during the ensuing season. Suitable tablets have been provided, upon which donors can mount their specimens, or they may be sent in wrapped in paper, duly marked with original locality.

The geological sieves, Walker's specific gravity balance, Bunsen burner, and other apparatus belonging to the section are placed in the rooms for the use of members. The rooms are available from 10 a.m. until 4 p.m. every day that the Museum is open. We have to report a second set of lectures on geology, followed by a class for the study of petrography, given by Prof. Cole, a list of which is subjoined. The lectures were well attended, the Committee being obliged to limit the number attending the practical class owing to the nature of the work undertaken,

and with much regret had to refuse some who wished to join.

THE STORY OF LIFE ON THE GLOBE.

A Course of Lectures, illustrated with lantern photographs delivered in the Museum, College Square North, on Saturday evenings, at 7-30 o'clock, by GRENVILLE A. J. COLE, M.R.I.A., F.G.S., Professor of Geology in the Royal College of Science for Ireland:—

I.—Jan. 12, 1895.—THE ANNALS OF THE EARTH.—Discovery of fossil remains in the rocks; theories regarding their origin. Differences observable between older faunas and those now prevalent on the globe. William Smith and the succession of faunas; first correct reading of the annals. Extinction of life-forms. Missing volumes of the annals. Division of past time into eras, periods, and epochs.

II.—Jan. 19.—THE FLOOR OF EUROPE.—Archæan Era.—Life-forms yet to be discovered. The oldest Radiolarians. The solemn warning of *Eozoon canadense*. Cambrian Period.—Brachiopods and Trilobites. The story of *Olenellus*.

III.—Jan. 26.—THE SEAS OF WALES.—Ordovician and Silurian Periods.—Graptolites and Sea-lilies. The Nautilus. Armour-plated Fishes.

IV.—Feb. 2.—THE GREAT LAKES OF IRELAND.—Devonian Period.—Decline of the Trilobites. Rivalry of Fishes and Sea-Scorpions.

V.—Feb. 9.—THE IRISH OCEAN AND ITS SHORES.—Carboniferous and Permian Periods.—Sea-lilies and Sea-urchins. The earliest Ammonites. Extinction of the Trilobites. Rise of the Amphibians. The Permian Reptiles. Forest and River Scenery; gigantic Club-Mosses.

VI.—Feb. 16.—BRITISH DESERTS AND THE COASTS OF TYROL.—Triassic Period.—Mingling of old and new types of Life. Advance of the Ammonites. Establishment of the Reptiles, and humble entry of the Mammals.

VII.—Feb. 23.—THE REPTILIAN EMPIRE.—Jurassic Period.—Increase of ordinary Shell-Fish. Triumph of the Reptiles. First appearance of a Bird.

VIII.—Mar. 2.—THE BAYS AND GULFS OF COUNTY ANTRIM.—Cretaceous Period.—Sea-Urchins and Oysters. Last struggles of the Ammonites. Decline and fall of the Reptilian Empire. Appearance of modern Vegetation.

IX.—Mar. 9.—A JOURNEY FROM LONDON TO PARIS.—Eocene and Oligocene Periods.—Lamellibranchs and Gasteropods. Great development of the Mammals. (Field excursion to Rhaetic, Liassic, and Cretaceous beds at Larnie.)

X.—Mar. 16.—THE MAKING OF THE ALPS AND APPENINES.—Miocene and Pliocene Periods.—Forms approaching those of the present day. Gigantic Mammals of Greece. Early Man and his companions on the earth. Shortness of our human history.

PETROGRAPHY.

1. Determination of rock-forming minerals:—Streak, cleavage, hardness, specific gravity, and acid tests.

2. Forms of crystals. Examination of the six systems of Crystallography.

3. Forms of crystals continued. Use of thin sections.

4. Some optical characters of rock-forming minerals

5 and 6. Structures and characters of rocks. Sedimentary rocks.

7 and 8. Igneous rocks. Classification and recognition.

9. Igneous and metamorphic rocks.

We cannot close this report without referring to the exhaustive analysis of glauconite from the upper greensand of Woodburn, carried out by A. Percy Hoskins, and the interesting paper on the co-called "Hullite" of Carnmoney, contributed by Prof. Cole. Reports of both these papers are printed in the Club's Proceedings.

The thanks of the Committee are due to Prof. Cole and

Messrs. Kendall and M^r Henry for the determination of rock specimens.

The sectional excursions held were as follows :—

May 12—Island Hill and Rough Island (Glacial).

June 23—Mourne Mountains.

July 28—North Woodburn (Palæontological).

Sept. 29—Magheramorne and Island Magee (Palæontological).

Dec. 24—Morrison's Sandpit, Dundonald.

March 9—Larne and Waterloo (Palæontological, conducted by Prof. Cole).

April 6—Divis (Glacial).

IX.—NEILL'S HILL, PARISH OF KNOCKBRED, CO. DOWN.

(Continued from last year).

Erratics.—Metamorphic grits, North Antrim or Derry, N.W. Chert (Silurian), Co. Down. Crushed quartziferous felstone, N. Antrim, Derry, N.W., or Tyrone, W. Mica trap, Co. Down. Porphyry, Cushendall, Co. Antrim, N.W.

X.—ISLAND HILL AND ROUGH ISLAND, PARISH OF COMBER, CO. DOWN.

Island Hill is a low cliff of boulder clay, resting on Trias, on the shore of Strangford Lough, near Comber. Rough Island can be reached from the shore at low water. (See Nos. 6 and 7 in next list.)

Erratics.—Ordovician grit and slate, Co. Down. Amphibolite, Co. Down, Antrim, or Derry, N.W. Dolerite, chalk and flint, Co. Antrim, N.W. Quartzite quartz and vein quartz, Bole (?) Granite, Slieve Croob, Co. Down. Pitchstone, Arran, N.N.E., or veins in granite of Co. Down. Eurite with Riebeckite, Ailsa Craig, N.N.E.

XI.—WOODBURN, PARISH OF S. NICHOLAS, CARRICKFERGUS.

Fossiliferous boulder clay 400 feet O.D. above basaltic plateau.

Erratics—Chalk, flint, claystone, eurite, Tornamoney Point, N. by W. A large boulder of porphyry was found at a height of 670 feet. Details given in next list (No. 12).

LARGE ERRATIC BOULDERS.

(These numbers follow consecutively upon last year's list.)

6. Ordovician Grit, 8 ft. x 5 ft. 2 ins. x 4 ft. 6 ins. On Rough Island, in Strangford Lough, near Comber, Co. Down. A low drift-covered Island. Weight $13\frac{1}{4}$ tons.

7. Ordovician Grit and Slieve Croob Granite, with an intrusive vein of granitoid rock, 6 ft. x 4 ft. 9 ins. x 4 ft. 6 ins. On Rough Island. Weight 9 tons.

8. Slieve Lamagan Granite (Mourne Mountains), 17 ft. 7 ins. x 10 ft. 6 ins. x 9 ft. 6 ins. high, resting on Ordovician Grits, dipping at a high angle, having arrested the boulder in its progress seawards. It has crushed and bent the upturned edges of the beds. Weight, 146 tons. The boulder rests on the edge of a small brook, at the end of a cottage at Moneydarragh Beg, on the coast road between Annalong and Ballymartin, County Down. Much rounded.

9. Carboniferous Millstone grit, at Blacklion, County Cavan, 13 ft. x 9 ft. x 1 ft 4 ins., resting on a neck of carboniferous limestone, capping an isolated mass of the rock. The upper surface sculptured with concentric circles. Weight, 8 tons. Nearest outcrop 10 miles off.

10. Gabbro with olivine, embedded in drift above Toboggan field at Holywood, Co. Down, with fragments of flint, chalk, basalt, and quartzite, measuring 6 ft. 9 ins. x 5 ft. x 3 ft. 4 ins. Base not quite exposed. Long axis E. x N. and W. x S. Considerably rounded and weathered. Weight, $9\frac{1}{2}$ tons.

11. "Ross's Rock" on sea shore opposite Macedon, Whitehouse, Co. Antrim, close to low tide mark. Fresh Olivine dolerite, 7 ft. 2 ins. x 8 ft. 10 ins. x 7 ft, considerably rounded. Portions have been blasted away. Weight, 33 tons.

12. Porphyry in boulder clay, found during the excavation of South Woodburn reservoir at a height of 670 ft. o.d. Weight about 2 tons. This rock closely resembles the intrusive boss at Cushendun.

NOTE.—The boulders numbered 10 and 11 and the nodular basalt mentioned in commencement of this report are from volcanic "necks" in Co. Antrim. (A. M'Henry, F.G.S.)

METEOROLOGICAL SUMMARY

FOR 1894.



WE have again to thank the Council of Queen's College, Belfast, for granting access to the records kept at that Institution, from which the following summary is compiled,

The station at which the records are made is situated in the Lagan Valley, at an elevation of about sixty feet above mean sea-level. The Belfast Hills, which attain a maximum elevation of 1,567 feet, lie to the west and north, stretching in a N.E. and S.W. line, and passing within three miles of the Observatory. Southward and eastward stretch the low undulating lands of Co. Down. Lough Neagh is situated some 14 miles to the westward. Belfast Lough approaches to within two miles on the N.E., and the open sea lies some 16 miles east of the observing station.

REVIEW OF THE WEATHER FOR 1894

Meteorological Observations taken at Queen's College, Belfast, at 9 a.m. each day.
Latitude, $54^{\circ} 35' N.$; Longitude, $5^{\circ} 56' W.$

BAROMETER										SELF-REGISTERING THERMOMETERS										HYGROMETER.					
70 Feet above Sea Level.—Actual Readings.										in shade, in stand outside window, 21 feet above ground.															
Highest of the Month.			Lowest of the Month.			Mean.		Range.		Highest of the Month.		Lowest of the Month.		Mean Maximum.		Mean Minimum.		Mean of two preceding.		Monthly Range.		Mean of dry Bulb		Mean of wet Bulb	
Inches.	Att. Ther.	Date	Inches.	Att. Ther.	Date	Inches.	Att. Ther.	Inches		Deg. F	Date	Deg. F.	Date	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.				
January...	30.600	40.0	3	29.180	38.0	31	29.602	43.3	1.420	52.0	11	6.0	6	46.3	33.0	39.6	39.6	38.2	37.0	46.0					
February..	30.380	45.0	20	29.220	45.0	11	29.810	45.4	1.160	56.0	8	29.0	1	49.4	36.7	48.0	48.0	42.0	40.1	27.0					
March....	30.420	48.0	23	29.000	43.0	13	29.866	46.1	1.420	62.0	30	29.0	16	52.6	36.3	44.4	44.4	44.6	43.3	33.0					
April.....	30.230	53.0	30	29.300	52.0	24	29.800	51.8	.930	63.0	11	37.0	1	56.6	42.7	49.6	49.6	49.7	47.0	26.0					
May.....	30.450	52.0	1	29.480	53.0	10	29.970	52.3	.970	62.0	25	31.0	22	56.8	40.6	48.7	48.7	49.4	46.0	30.5					
June	30.420	65.0	29	29.730	52.0	5	29.990	57.5	.694	73.0	28	40.0	6	63.9	47.4	55.6	55.6	56.8	52.7	33.0					
July.....	30.200	65.8	1	29.350	62.0	12	29.850	62.5	.850	77.0	1	48.0	8	63.6	52.0	60.3	60.3	61.2	56.6	29.0					
August....	30.250	58.0	29	29.220	60.0	14	29.877	55.5	.930	73.0	1	46.0	6	65.5	51.5	58.5	58.5	58.8	54.5	27.0					
September	30.480	55.0	14	29.880	56.0	25	30.220	54.6	.600	66.0	2	32.5	28	60.8	44.7	52.7	52.7	53.6	50.8	33.5					
October...	30.440	52.0	1	28.724	50.0	25	29.860	49.3	1.716	64.0	14	29.0	22	55.8	41.5	48.6	48.6	50.0	47.4	35.0					
November	30.574	52.0	27	29.110	45.0	12	29.800	46.8	1.464	60.0	3	30.0	24	52.7	39.4	46.0	46.0	45.3	43.3	30.0					
December	30.700	44.0	27	29.300	47.0	22	29.885	48.2	1.400	58.0	14	30.0	31	49.9	37.2	43.5	43.5	43.0	40.1	28.0					
Totals....	365.144	629.8		351.594	603.0		358.530	613.2	13.554	766.0		338.0		678.9	503.0	590.5	590.5	592.6	558.8	378.0					
Means...	30.429	52.5		29.299	50.2		29.877	51.1	1.129	63.8		32.3		56.6	41.9	49.2	49.2	49.4	64.5	31.5					

REVIEW OF THE WEATHER FOR 1894.—Continued.

	WIND.										RAINFALL.		
	Direction and Amount of Wind, as indicated by Casella's Self-Recording Anemometer.										Gauge—Diameter of Receiver, 1 in.; height of top above ground, 7ft. 1 in.; height above sea level, 60ft.		
	Average Daily Direction.					Daily Amount.					Total Depth.	Greatest fall in one day.	
	N. N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Var.	Greatest in one day.	Least in one day.	Mean Daily Am't.	Inches.	Date.
	Days	Days	Days	Days	Days	Days	Days	Days	Miles.	Date.	Miles.	Inches.	Days.
1894.													
January..	1	3	2	6	3	10	5	—	1	7th	286	3·663	5th
February..	—	—	1	2	5	10	8	1	1	20th	316	3·373	10th
March.....	1	1	4	5	3	10	4	1	2	25th	206	2·038	7th
April.....	3	3	6	8	5	—	—	2	3	1st	224	1·768	14th
May.....	5	4	4	1	2	2	5	5	3	30th	224	2·299	13th
June.....	1	6	5	1	2	3	6	4	2	9th	160	3·033	4th
July. . . .	—	1	3	2	4	4	3	6	1	10th	149	3·663	1st
August.....	1	3	3	—	—	2	9	13	—	30th	198	1·740	14th
September..	2	13	8	2	1	1	1	2	1	14th	133	·056	2nd
October.....	1	5	5	4	5	7	1	—	3	3rd	176	6·191	23rd
November...	1	1	1	2	3	12	9	2	—	26th	211	1·739	13th
December..	2	—	—	3	2	7	10	6	1	4th	221	2·062	21st
Totals.....	18	43	41	38	36	64	64	42	18		2504	31·625	
Means... ..									44		209		

No. of days on which fell.

R U L E S

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the objects of the Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall first pay an entrance fee of 5/-, and be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of the votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club; and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consists of a President, Vice-President, Treasurer, and two Secretaries, and ten Members, who form the Committee. Five to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

VIII.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collections of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

IX.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

X.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subject mentioned in such written requisition.

XI.

That the Committee may be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its members by such other societies.

The following Rules for the Conducting of the Excursions have been arranged by the Committee.

I.—The Excursion to be open to all Members ; each one to have the privilege of introducing two friends.

II.—A Chairman to be elected as at ordinary meetings.

III.—One of the Secretaries to act as conductor, or, in the absence of both, a Member to be elected for that purpose.

IV.—No change to be made in the programme, or extra expense incurred, except by the consent of the majority of the Members present.

V.—No fees, gratuities, or other expenses to be paid except through the conductor.

VI.—Every Member or visitor to have the accommodation assigned by the conductor. Where accommodation is limited, consideration will be given to priority of application.

VII.—Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII.—Those who attend an Excursion without previous notice will be liable to extra charge, if extra cost be incurred thereby.

IX.—No intoxicating liquors to be provided at the expense of the Club.



BELFAST NATURALISTS' FIELD CLUB.

THIRTY-THIRD YEAR.

THE Committee offer the following prizes to be competed for during the Session ending March 31st, 1896 :—

I.	Best Herbarium of Flowering Plants, representing not less than 250 species	...	£1	0	0
II.	Best Herbarium of Flowering Plants, representing not less than 150 species	...	0	10	0
III.	Best Collection of Mosses	...	0	10	0
IV.	" " Lichens	...	0	10	0
V.	" " Seaweeds	...	0	10	0
VI.	" " Ferns, Equiseta, and Lycopods	...	0	10	0
VII.	" " Tertiary and Post-tertiary Fossils	...	0	10	0
VIII.	" " Cretaceous Fossils	...	0	10	0
IX.	" " Liassic Fossils	...	0	10	0
X.	" " Permian and Carboniferous Fossils	...	0	10	0
XI.	" " Older Palæozoic Fossils	...	0	10	0
XII.	" " Marine Shells	...	0	10	0
XIII.	" " Land and Freshwater Shells	...	0	10	0
XIV.	" " Lepidoptera	...	0	10	0
XV.	" " Hymenoptera	...	0	10	0
XVI.	" " Coleoptera	...	0	10	0

- XVII. Best Collection of Crustacea and Echinoder-
mata £0 10 0
- XVIII. Best Collection of Fungi; names of species
not necessary. Collectors may send (post-
paid, from time to time during the season)
their specimens to Rev. H. W. Lett, M.A.,
T.C.D., Aghaderg Glebe, Loughbrickland,
who will record them to their credit ... 0 10 0
- XIX. Best Collection of Fossil Sponges ... 0 10 0
- XX. Best Collection of 24 Microscopic Slides,
illustrating some special branch of Natural
History. 0 10 0
- XXI. Best Collection of 24 Microscopic Slides,
showing general excellence 0 10 0
- XXII. Best Set of Field Sketches appertaining to
Geology, Archæology, or Zoology ... 0 10 0
- XXIII. Best Set of 12 Photographs, illustrative of
Irish Archæology 0 10 0

SPECIAL PRIZES.

- XXIV. The President offers a Prize of £1 1s. for the Best
Set of three or more Original Sketches, to be placed
in the Album of the Club. These may be executed
in pen and ink, or water colour, and must illustrate
one or more ancient monuments somewhere in
Ireland. In determining the relative merits of the
sketches, accuracy in representing the subjects and
their details will have chief place. This Prize is
open to the Members of the Belfast Art Society,
and to the Students of the School of Art.
- XXV. William Swanston, F.G.S., offers a Prize of 10s. 6d.
for Six Photographs from Nature, illustrative of
Geology, contributed to the Club's Album.

- XXVI. Francis Joseph Bigger, Hon. Secy., offers a Prize of £1 is. for the Best Set of Twelve Photographs (not less than cabinet size), of Ecclesiastical Structures, mentioned in Reeves' *Ecclesiastical Antiquities of Down and Connor*, contributed to the Club's Album. The Set of Photographs taking the Prize cannot be admitted in competition for Prize 23.
- XXVII. W. H. Patterson, M.R.I.A., offers a Prize of £1 is. for the Best Collection of Flowering Plants, species not to exceed 50 in number, and 20 of these at least to be plants of considerable rarity ; to be personally collected in Ulster during the year, to be named, with localities and dates attached. Judges—S. A. Stewart and R. L. Praeger, or either.
- XXVIII. The Secretary of the Ulster Fauna Committee offer a Prize of 10s. for the Best Collection of Bats, Rodents, Insectivora, and Carnivora (names not necessary) collected in Ulster during the year. Specimens to be sent in a fresh state to the Museum, Belfast.
- XXIX. Mrs. Smythe, of Tobarcooran, Carnmoney, offers a Prize of £1 is. for the Best Collection of Irish names of places, with meanings, in the counties of Down and Antrim, *not* included in Joyce.

CONDITIONS.

No Competitor to obtain more than two Prizes in any year.

No Competitor to be awarded the same Prize twice within three years.

A member to whom Prize I. has been awarded shall be ineligible to compete for Prize II., unless the plants are additions to those in previous collection.

In every case where three or more persons complete for a Prize, a second one, of half its value, will be awarded if the conditions are otherwise complied with.

All collections to be made personally during the Session, in Ireland, except those for Prize XXI., which need not necessarily be Irish, nor Competitor's own collecting. The species to be classified according to a recognised system, to be correctly named, and localities stated, and a list to accompany each collection. The Flowering Plants to be collected when in flower, and classified according to the Natural System. The Microscopic Slides to be Competitors' own preparation and mounting. The Sketches and Photographs to be Competitors' own work, executed during the Session; and those sets for which Prizes are awarded to become the property of the Club.

No Prizes will be awarded except to such Collections as shall in the opinion of the Judges, possess positive merit.

The Prizes to be in books, or suitable scientific objects, at the desire of the successful competitor.



NOTICE.

EXCHANGES OF PROCEEDINGS.

Barrow—Naturalists' Field Club.

Annual Report and Proceedings, Vol. IX., and Reports 1883 to 1890.

Belfast—Natural History and Philosophical Society.

Report and Proceedings, 1893-94.

„ Ulster Journal of Archæology.

Vol. I., Parts 1, 2, and 3.

Bath—Natural History and Antiquarian Field Club.

Proceedings, Vol. VII., No. 1.

Bergin—Bergens Museums.

Aarbog for 1893.

Berlin—Verhandlungen der Gesellschaft Fur Erdkunde zu Berlin.

Band XXI., 1894, No. 10.

Berwickshire Naturalists' Field Club.

Proceedings, Vol. XVI., No. II.

Brighton and Sussex Natural History and Philosophical Society.

Annual Report, 1894.

Bristol Naturalists' Society.

Proceedings, Vol. VII., Part 3.

Cardiff—Naturalists' Society.

Report and Transactions, Vol. XXVI., Parts 1 and 2.

Cornwall—Royal Institution of.

Journal, Vol. XII., Part 1.

Costa Rica—Museo Nacional de Costa Rica, Hormigas de Costa Rica, Etnologia Centro Americano.

Anales del Instituto Geographico y del Museo Nacional, Tomo IV., 1891.

Dublin—Royal Irish Academy.

Proceedings, Vol. II., Nos. 4 and 5; Vol. III., No. 3.

Transactions, Vol. XXX., Parts 13 and 14.

Cunningham Memoirs, No. X.

„ Royal Society of Antiquaries of Ireland.

Journal, Vol. V., Part 1; Vol. IV., Parts 2 and 3.

Proceedings.

Edinburgh—Botanical Society of.

Transactions and Proceedings, Vol. XX., Part 1.

„ Geological Society of.

Transactions, Vol. VII., Part 1.

Frankfort—Helios.

Jahrgang 7, Nos. 7 to 12, 1894-95.

„ Societatum Litterae.

Jahrgang 8, Nos. 10 to 12; Jahrgang 9, Nos. 1 to 3.

„ Bericht über die Senckenbergische naturforschende Gesellschaft, 1894.

Glasgow—Philosophical Society of.

Proceedings, Vol. XXV.

Halifax, N.S.—Nova Scotian Institute of Science.

Proceedings and Transactions, Vol. 1., Part 3.

Hamilton (Canada)—Hamilton Association.

Journal and Proceedings, No. X.

Hertfordshire Natural History Society and Field Club.

Transactions, Vol. VII., Parts 8 and 9.

Hull—Geological Society.

Transactions, Vol. I., 1893-94.

Liverpool Geological Society.

Proceedings, Vol. VII., Part 2.

„ Geological Association.

Journal, Vol. XIV, 1892-93 and 1893-94.

London Geologists' Association.

Proceedings, Vol. XIII., Parts 7 to 10; Vol. XIV., Part 2.

„ British Association for Advancement of Science.

Report, 64 Meeting, Oxford, 1894.

Manchester—Field Naturalists' and Archaeological Society.
Report and Proceedings, 1893.

„ Microscopical Society.
Transactions and Annual Report, 1893.

Marlborough—College Natural History Society.
Report, No. 42.

Norfolk and Norwich—Naturalists' Society.
Transactions, Vol. V., Part 3.

Penzance Natural History and Antiquarian Society.
Report and Transactions, 1893-94.

Plymouth—Institution.
Annual Report and Transactions, Vol. IX., Part 4.

St. John's, N.B.—Natural History Society of New Brunswick.
Bulletin XII.

Stavanger—Museum.
Aarsberetning, 1893.

Toronto—Canadian Institute.
Transactions, No. 7.
Annual Report, 1893-94.

Trinidad—Field Naturalists' Club.
Journal, Vol. II., Nos. 1 to 4.

Wiltshire—Archaeological and Natural History Society.
Magazine, Vol. XXVII., No. 81.

U.S.A.—Boston Society of Natural History.
Proceedings, Vol. XXVI., Parts II and III.

„ Massachusetts Tufts College.
Studies, Nos. 2 and 3.

„ Meridan Scientific Association.
Review, 1893.

„ Milwaukee Public Museum.
Report, 1892-93.

„ New York—American Museum of Natural History.
Annual Report, 1893.
Bulletin, Vol. X., 1893.

„ „ Academy of Science.
Transactions, Vol. XIII.

U.S.A.—Philadelphia Academy of Sciences.

Proceedings, 1893, Part III; 1894, Parts I and II.

„ Raleigh, N.C.—Elisha Mitchell Scientific Society.
Journal, Vol. X., Parts 1 and 2; Vol. XI., Part 1.

„ Salem—Essex Institute.
Bulletin, Vol. 15, Parts 4 to 12; Vol. 26, Parts 1 to 3.

„ „ American Association for the Advancement of
Science.

Proceedings of 42nd Meeting at Madison, 1893.

„ Staten Island—Natural Science Association.
Proceedings, Vol. IV., Parts 1 to 15.

„ St. Louis—Academy of Sciences.
Transactions, Vol. VI., Nos. 9 to 17.

„ Washington—Smithsonian Institution.
Annual Report, 1892.
Reports of U.S. National Museum, 1891 and 1892.

„ „ U.S. Geological Survey.
Twelfth Annual Report, Part I., Geology.
„ „ Part II., Irrigation.
Thirteenth „ „ Part I., Geology.
„ „ Part II., Irrigation.
„ „ Report of Directors.

Received from the Author.

Professor T. Rupert Jones, F.R.S., F.G.S.

On the Rhastie and some Liassic Ostracoda of Britain.



BELFAST NATURALISTS' FIELD CLUB.

THIRTY-THIRD YEAR, 1895-96.

LIST OF OFFICERS AND MEMBERS.

President :

F. W. LOCKWOOD, C.E.

Vice-President :

LAVENS M. EWART, M.R.I.A.

Treasurer :

W. H. PHILLIPS,
8 CHICHESTER STREET.

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QUEEN'S STREET.

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Hon. Secretaries :

FRANCIS J. BIGGER, M.R.I.A., REA'S BUILDINGS.

ALEC. G. WILSON, STRANMILLIS, BELFAST.

Members.

Any Changes in the Addresses of Members should be at once notified to the Secretaries by Post Card.

Adams, John J., M.D., Ashville, Antrim.

Agnew, A. W., Dunedin.

Allen, Hugh, 18 College St. South.

Alderice, David, Craigfernie Terrace, Lisburn Road.

Allen, Joseph, Solicitor, Lisburn.

Allibon, George, 30 Donegall Place.

Allingham, Hugh, Ballyshannon.

Allworthy, Edward, Mosaphir.

Anderson, John, J.P., East Hillbrook, Holywood.

Anderson, Robert, Donegall Place.

Anderson, John M., Marlborough Park.

Anderson, James F., Ponsonby Avenue.

Anderson, Henry S., Dunmurry.

Andrew, J. J., L.D.S., Belgravia.

Andrew, Rev. John, 25 Rugby Road.

Andrews, Miss M. K., 12 College Gardens.

Andrews, Miss, 12 College Gardens.

Armstrong, Rev. J. E., 22 Belgravia Avenue.

Barkley, Jas. M., Queen's Square.

Barklie, Robert, M.R.I.A., Working Men's Institute.

Barbour, John H., 1 Hamilton Villas, Ballyholme, Bangor.

Barr, James, Beechleigh, Windsor Park.

Barr, John, Ava Terrace, Holywood.

Batt, William, Sorrento, Windsor.

Beattie, Rev. A. H., Portglenone.

Beck, Miss Emma, Old Lodge Road.

Beggs, D. C., Ballyclare.

Bell, Robert, Charleville Street.

Bell, Leonard, Braemar Terrace, Balmoral.

Bell, Miss Alice J., Braemar Terrace, Balmoral.

Best, James, Clarence Place.

Bigger, Francis Joseph, Ardrie.

Bingham, Edward, Ponsonby Avenue

Blair, E., Elgin Terrace, Limestone Road.

Blair, Mrs., Elgin Terrace, Limestone Road.

Bland, Thomas, Woodbank, White-abbey.

Blythe, Samuel, 12 South View, Deramore Avenue.

Boyd, Miss, Chayo, Adelaide Park.

Boyd, J. St. Clair, M.D., 27 Great Victoria Street.

Boyd, Miss, Cultra House, Holywood.

Boyd, Miss Ethel, 43 Victoria Place.

Boyd, Wm. A., 2 Cliftonville.

Boyd, Wm., 43 Great Victoria St.

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Davison, Robert, Palmerston, Sydenham.

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Ewart, Clement C., Glenbank.

Ewart, Ernest, Glenbank.

Ewart, Wm., Glenmachan.

Ewart, Sir Wm. Q., Bart., Glenmachan.

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Fraser, R. N., 271 Albertbridge Rd.

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Fullerton, George, Croagbeg, Bushmills.

Fulton, David, Arlington, Windsor Avenue.

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Hardy, Gardner, 5 Wellington Park.

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Heron, F. A., Cultra, Holywood.

Herre, Miss, Hopefield, Belfast.

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Lepper, F. R., Elsinore, Crawfords-
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Glebe, Loughbricland

Letts, Prof. E. A., Dunavon, Craig-
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Lockwood, F. W., Wellington Park
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Logan, Mrs., Bangor.

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Macassey, J. L., Stanley House,
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MacCormac, Dr. John, Gt. Victoria
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Macdonald, Miss, Bantry, Co. Cork.

Macdonald, Wm., Carlisle Circus.

MacDowell, Wm. A., 69 Upper
Arthur Street.

MacElheran, W. F., 3 College
Gardens.

Mackenzie, John, Malone.

Maconachie, Rev. James, Erindale,
Cliftonville Avenue.

Macrory, Mrs., Eia, Antrim Road.

Major, Rev. J. J., Belvoir Hall,
Belfast.

Malcolmson, Greer, Malone Park.

Malcolmson, Harold, Holywood.

Malcolmson, James, Cairnburn,
Strandtown.

Malcolmson, Mrs., Cairnburn,
Strandtown.

Mann, Jas. S., Ballyholme, Bangor.

Marsh, Mrs., Glenlyon, Holywood.

Marsh, Jos. C., Castleton Terrace.

Marshall, H., Edlingham Terrace,
Duncairn Gardens.

Martin, Adam, Knock, Belfast.

Martin, J. McClelland, Northern
Counties Railway.

Mathewson, Mrs., Helen's Bay.

Maxton, James, Ulster Street.

May, Robert, Lothair Avenue.

Millen, Samuel S., B.A., 44 Ulster-
ville Avenue.

Milligan, A., 3 Hartington Street.

Milligan, S. F., M.R.I.A., Alberta,
Malone Road.

Mitchell, J. S., 47 Magdala Street.

Mollan, W. S., 10 Brunswick Street

Mollan, Miss, University Square.

Montgomery, R. M., 22 Corporation
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Moore, John, Shaftsbury Square.

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naveigh.

Moore, Jas., Corunna House, Bally-
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Moore, Samuel, 1 Clifton Terrace.

Moorissy, E. J., Lavinia Street.

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Morrow, David, Church Hill, Holy-
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Morton, John, Cliftonpark Avenue.

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Murdoch, James, 10 Ponsonby Avenue.

Munce, W. B., Rosemary Street.
Murray, P., 95 Fitzroy Avenue.
Myles, Rev. E. A., Banbridge.

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M'Alister, Thos., Eglinton Street.
M'Bain, Alex., 66 York Street.
M'Cance, J. S., Dunmurry.
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Fitzroy Avenue.

M'Chesney, Jos., Holywood.
M'Clean, F. P., Huntly Villas,
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M'Cleery, H., 82 Cliftonpark Aven.
M'Cleery, J. O., " "
M'Cleery, Wm. H., 22 Landscape
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M'Clure, W. J. Elizabeth Street.
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Ballynafeigh.

M'Connell, Miss, Annadale Hall,
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M'Cormick, John, The Hermitage,
Bloomfield.

M'Cormick, Mrs., The Hermitage,
Bloomfield.

M'Cullough, John, Martello, Holy-
wood.

M'Cullough, J. C., Holywood.

M'Cullough, Wm., Belfast Bank,
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M'Duff, Miss Sarah, 48 South
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Strandtown.

M'Illwaine, Mrs., Ravensdale, Strand-
town.

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M'Kee, Robert, M.A., Harlesden
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don, N.W.

M'Kee, Miss, Harlesden College,
Bramshill Road, London, N.W.

M'Kee, Wm. S., 20 Mill Street.

M'Kenzie, Dr. W. G., Gt. Victoria
Street.

M'Kinney, W. F., Ballycraig,
Carnmoney.

M'Kisack, Alfred, Mountcharles.

M'Kisack, Dr. H. L., College Square
East.

M'Lean, Geo., 8 Pottinger Street.

M'Leish, John, The Mount, Mount-
pottinger.

M'Mordie, David, 6 Camden Terrace.

M'Mordie, James, Belgravia Aven.

M'Neill, John, 12 May Street.

Nicholl, Wm., Donegall Square
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Nicholson, H. J., Windsor Gardens.

Nelson, Miss, 1A India Street,
Botanic Avenue.

Nesbitt, W. C., Kinnaird Terrace.

O'Neill, Henry, M.D., 6 College
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O'Neill, James, M.A., 5 College
Square East.

Orr, H. Lamont, Garfield Street.

O'Shea, P. J., 62 South Parade, City

Oswald, Jas. S., 42 Berry Street.

Oswald, Andrew S., jun., Warboro',
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Parker, W. H., Tudor Park, Holy-
wood.

Patterson, D. C., Clanbrassil Terrace,
Holywood.

Patterson, R. L., jun., Clanbrassil
Terrace, Holywood.

Patterson, Wm. H., Clanbrassil Ter.,
Holywood.

Patterson, Richard, J.P., Kilmore,
Holywood.

Patterson, Miss Clara, Kilmore,
Holywood.

Patterson, R. L., J.P., Croft House,
Holywood.

Patterson, Robt., M.B.O.U., Lilo-
court, Malone Park.

Patterson, Wm. H., M.R.I.A.,
Garranard, Strandtown.

Patterson, S. R., 1 Lombard Street.

Paul, John, Assembly's College,
Belfast.

Paul, Thomas, Redcot, The Knock.
Payne, J. C. C., J.P., Oxford
Buildings.

Payne, Mrs., Botanic Avenue.

Peddie, J. F., 9 Donegall Square
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Pender, Mrs. M. T., Glengormley.

Perry, T. G., Lisburn Road.

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Ritchie, James, c/o. Millar, Boyd, &
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wood.

Robinson, Wm. A., J.P., Culloden,
Cultra.

Robinson, Samuel, Helen's Bay.

Roscorla, Lakes, Acreville, Osborne
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Ross, John, Cliftonville.

Ross, Richard, M.D., Wellington
Place.

Ross, Wm. A., Iva-Craig, Craigavad

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Scott, Conway, C.E., Windsor Av.

Scott, Henry, 12 May Street.

Shanks, James, Ballyfounder, Porta-
ferry.

Shannon, James, Kinnegar, Holy-
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Shaw, Wm. Hinde, Brooklyn, Knock

Shaw, Launcelot, " "

Shaw, Mrs., " "

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Small, Hugh, Sullivan School,
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 Stewart, Pakenham, Knockbreda Rectory.
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 Thompson, Mrs. H., Crosshill, Windsor.
 Thompson, Rev. David, Dromore.
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 Todd, Wm A., 24 Victoria Street.
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 Tulloch, Miss, Howard Street.
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 Walker, W. J. D., Lawrencetown, Co. Down.
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 Walkington, T. R., Edenvale, Strandtown.
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Workman, Thos., J.P., Holen's Bay
Workman, J., Methodist College, City.

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Wright, Miss, Alfred Street.

Wylie, William, Mountpleasant.

Young, Robert, J.P., C.E., Rath-
varna, Chichester Park.

ANNUAL REPORT AND PROCEEDINGS

OF THE

BELFAST NATURALISTS' FIELD CLUB

For the Year ending 31st March, 1896.

(THIRTY-THIRD YEAR.)

SERIES II.

VOLUME IV.



PART III.

1895-96.

Belfast :

PRINTED FOR THE CLUB

BY ALEXANDER MAYNE & BOYD, 2 CORPORATION STREET.

PRINTERS TO QUEEN'S COLLEGE, BELFAST.

1896.

REPORT.

The Committee of the Belfast Naturalists' Field Club now lay before the Members the thirty-third Annual Report. The work of the Club has been steadily carried on during the past year, some good results having been obtained, especially by the different sections of the Club, whilst an increasing co-operation with the different other scientific Societies of Ireland has been maintained. The Conference of all the Irish Field Clubs held in Galway during July under the auspices of the Irish Field Club Union was a hearty stimulus in this direction, going far to assimilate the members of the different Field Clubs into one active scientific organisation that must work for the good of systematic work in natural science in Ireland. It is the earnest desire of your Committee whilst not in one whit sacrificing the individuality of the Club, nor the premier position it occupies, to cordially co-operate with the other Irish clubs some of which are necessarily weaker in membership and financial position. Thus a federation may be formed, conferring strength and unity and enabling scientific investigation to be comprehensively and thoroughly carried out over the whole country.

The creation of an entrance fee has acted as desired in keeping the membership of the Club within working bounds without materially affecting the finances of the Club. The membership now stands at 480, 32 new members having been elected during the year, 68 having died, resigned, or been struck off.

During the summer the invariable good weather which attends the Club rambles favoured the members. The attendance varied from 107 at Glynn to 18 at Glenariff.

The following is a list of the summer excursions :—

Greyabbey	...	...	...	18 May.
Glynn and Gleno	...	...	...	1 June.

Valley of the Roe	..	...	...	15 June.
Galway	...	..	...	11, 17 July.
Gobbins (half day)	...	..	.	20 July.
The Mourne Mountains	...	..	..	30 July.
Glenariffe	...	...	...	27 August.
Bryansford	...	..	...	14 September.

During July the London Geologists' Association visited Belfast and were officially received and entertained by the Club. During their stay, different members of the Club acted as guides for their excursions, and their programme and arrangements were attended to by the Honorary Secretaries, thus conferring a great benefit on the visitors which was much appreciated by them and duly acknowledged. The "Home Reading Union" was treated in a similar manner.

The winter meetings were as follows :—

14 Nov., 1895.	Annual Social Meeting.
19 " "	Presidential Address.
19 Dec. "	Craiganogh Cave—Miss Nora M. Steen. 2. The Silurian Shales of Pomeroy—Robert Bell. 3. Galway Excursion—Alex. G. Wilson, Hon. Sec. 4. Notes on the Geological Excursions by Miss S. M. Thompson.
21 Jan., 1896.	Our Plants and Animals—Geo. H. Carpenter.
29 " "	A Holiday Trip from Belfast to Galway—Wm. Gray.
18 Feb. "	Gaelic Charms—W. H. Patterson.
17 Mar. "	Microscopical evening.
21 April "	Annual Meeting

The average attendance at all these meetings was good, while the room was quite crowded on the occasion of the lecture by Wm. Gray.

During March a week's good geological work was done in a systematic way under the instruction of Professor Cole, there being an excursion to different places of interest each day, and a class in the evening for practical work with the microscope.

The Microscopical Section with W. D. Donnan, M.B., as Secretary, has also been fairly active (see Report, page 301).

The Ethnographical Section contemplates carrying out a course of lectures during the coming autumn.

The Geological Section, with Miss S. M. Thompson as

Secretary, has been most active during the Session (see Report, page 302).

The Celtic Class having been nurtured to maturity under the sheltering care of the Club, has now formed a separate organisation—The Belfast Gaelic League—which is both active and prosperous and likely to do good work in advancing the study of the Irish language. Any of the members interested in the preservation of the Celtic tongue should take advantage of this Society.

The Botanical Section, formed during the year under the guidance of the Rev. C. H. Waddell, B.D., has made satisfactory progress, and will doubtless continue to keep this important study in the forefront of the Club's work. This Section is the practical outcome of Professor Johnson's course of Botanical Lectures last session.

The following is the report of judges appointed to examine the collections sent in by members in competition for prizes :—

We have carefully examined the four sets of Micro slides submitted in competition for the Club prizes, No. 21 and 22. Each set is of very high merit, and maintains the standard of the Club's best work.

Prize No. 21 we award to the Rev. John Andrew for a very excellent set of slides illustrative of rock structure, being chiefly sections of Northern Basalts and Granites carefully selected, skilfully prepared, and very neatly mounted and named.

Prize No. 22 we award to Henry Hanna, A.B., for a very superior collection of slides illustrative mainly of Marine Zoology, including good typical examples of Protozoa, Hydrozoa, Porifera, Actinozoa, Crustacea, and Tunicata, all properly prepared and neatly mounted, forming a valuable set for educational purposes.

WILLIAM GRAY.

JOSEPH WRIGHT.

S. A. STEWART.

Your Committee trust that during the coming Session more individual research will be done by the members, and regret

that there is not more competition for the Club's prizes and for those presented by members.

The best thanks of the Club are due to the different persons who conferred favours during the season, to the different Railway Companies for the special facilities offered, and to the local Press for the lengthened reports of Club's proceedings given from time to time. In conclusion, your Committee express their satisfaction with the lengthened notices of the Club's proceedings given from month to month in the "Irish Naturalist," and hope the members will see their way to support this very excellent publication and thus keep themselves acquainted with the field work being done in Ireland.

FRANCIS JOSEPH BIGGER,
ALEX. G. WILSON,
Hon. Secs.

THE TREASURER IN ACCOUNT WITH THE BELFAST NATURALISTS' FIELD CLUB

Dr.

For the Year ending 31st March, 1896.

2.

To Balance from last	..	..	£6 4 2	By Expenses of Social Meeting ..	..	..	£22 7 0
" Subscriptions	..	..	109 15 0	" Printing Annual Proceedings ..	..	..	48 16 0
" Entrance Fees	..	..	8 0 0	" Stationery, Printing, &c. ..	..	..	14 3 6
" Tickets Sold for Conversazione	..	..	14 9 0	" Donation to <i>Irish Naturalist</i> ..	..	..	2 0 0
" Sales of the Proceedings	..	£0 3 6		" Donation to Irish Field Club Union	..	..	2 2 0
" Do. Floras	..	1 11 6		" Rent of Museum ..	..	..	11 6 0
" Do. Lists	..	1 2 0		" Expenses of Lectures ..	..	..	1 11 0
			2 17 0	" Prizes ..	..	..	1 0 0
				" Insurances ..	..	..	1 4 6
				" Postages ..	..	..	24 8 1
				" Gas Accounts ..	..	..	1 19 4
				" Incidentals ..	..	..	1 19 5
				" Geological Section ..	..	..	1 0 0
				" Collector's Commission ..	..	..	7 3 2
				" Balance to next Account ..	..	..	0 5 2
							£141 5 2

Audited and found correct,

S. A. STEWART.

W. H. PHILLIPS, *Treasurer.*

PROCEEDINGS.

SUMMER PROGRAMME.

EXCURSIONS.

18 May.

GREYABBEY.

On Saturday, 18 May, the first excursion of the season was held, when the Club paid a visit to the old Cistercian Monastery at Greyabbey. A pleasant morning found a party of 60 collected at the Linen Hall Library at 10 a.m., and a start was made at once in brakes. Passing by Dundonald, Newtownards, and other places of interest, the first halt was made at Mountstewart, the seat of the Marquis of Londonderry. Here the fine mansion was thrown open to the members, after which the cromleac occupied the attention of the party, and was freely photographed. This cromleac, as W. Gray, M.R.I.A., pointed out, was once the centre of a large tumulus, which has since disappeared, leaving only its core. Having examined this relic, the party proceeded to Greyabbey. This religious house was founded, according to the *Monasticon Hibernicon*, by Lady de Courcy, the wife of John de Courcy, and daughter of the King of Man, and was settled by Cistercian Monks from Holm Cultram, in Cumberland. Here Lady de Courcy took up her abode prior to her death; tradition says she built it in accordance with a vow made to the Blessed Virgin during a terrible hurricane at sea. We learn from the Montgomery MSS. that Sir Brian MacFelim O'Neill, in anger at Queen Elizabeth giving his lands to Sir Thomas Smith, burnt down the abbey,

with all other structures available for garrisons. The members appreciated the numerous features of interest, the more so that the owner, General Montgomery, keeps the whole place in such beautiful order, and thus makes the spot an ideal one, to which too few of the ruins of this country attain. A most notable feature is the number and variety of mason's marks on the stones, which are comparable to marks found in other buildings in Great Britain, France, Germany, Spain, Portugal, and Palestine. The lines used by the stonecutter some 700 years ago for squaring up the stone are also visible here and there. The crowded graveyard to the east of the abbey was also visited, where lies the old table tomb of the "Rev. James Porter, Dissenting minister of Gray Abbey." He it was who wrote the famous letters in the "Northern Star," entitled "Squire Firebrand," for which he was hanged in 1708 in view of his own manse.

Tea was provided on the hill close by, where an extensive view delighted the eyes of all present. Strangford Lough and its islands, with the blue Mourne Mountains in the distance, and the ruins of the old abbey nestling amongst the trees beneath, added every feature necessary for a perfect picture ; in fact, it is doubtful if there is so fine a view in all County Down as is here to be had in the evening sunlight.

At five o'clock the wagonettes were then once more mounted, and the party drove off, passing on the way, close to Mountstewart, a vast erratic of basalt resting on triassic sands and marls, of which R. Welch has taken a capital photograph. Belfast was reached at eight o'clock, where the members dispersed. The botanists of the party found nothing rare, but *Scedum telephium* and *Anchusa sempervirens*, which were in great quantity. In one spot the double variety of the lesser celandine and an extremely large variety of the bluebell were growing in abundance. The geologists only spent a few minutes at a small section of boulder clay, from which, however, a good specimen of a striated block was extracted.

1 *June.*

GLYNN.

On the afternoon of Saturday, 1 June, a party of about forty left by the midday train for Glynn. On arrival there the Old Church, unique in the diocese of Connor, with its chancel and nave and small circular connecting arch was examined, after which the party divided into sections taking different routes to Gleno, plant collecting being the special feature of the day, a prize having been offered for the best collection. The botanists were favoured with the presence of Professor Johnson, of the Royal College of Science, who rendered much assistance throughout the day. After tea in the schoolroom at Glynn a hurried examination of the different plant collections was made and the prize awarded to Richard Hanna for a set of flowering plants numbering almost 100 species. J. St. J. Phillips found near Gleno a bed of boulder clay containing Lower Lias fossils.

15 *June.*

VALLEY OF THE ROE.

The third excursion of the club was held on Saturday, 15 June, when a party of twenty-five proceeded by the Northern Counties Railway to Limavady and the valley of the Roe, a through carriage having been kindly placed at the disposal of the members by the manager. On arrival at Limavady a start was made for the glen, a distance of two miles. The first halt was made at O'Cahan's Rock, where the party spent a pleasant hour botanising, lunching, and photographing, the splendid crag forming a feature hard to surpass.

Mrs. Leebody, the well known Derry botanist, joined here, and her local knowledge proved useful throughout the day. A steep climb from the river bed brought all to the top of the

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steep path to the "Black Cave" in the basalt, which proved, however, less interesting than was expected, save for its historic association. Here it was that Lieutenant Moses Hill, the head of the now great house of Downshire, lay concealed for a considerable time in 1588, after the disastrous affray with MacDonnell at Altfracken, when the Scot put to flight the soldiers from Carrickfergus, and Sir John Chichester lost his head. The cave extends inland a distance of over 100 feet, and is washed by the tide. The remains of a wall extend across its mouth, so its uses have been, doubtless, various—legitimate and illegitimate—the latter in the "good old days" when it was quite respectable to rob the King of his dues. The most of the party walked along the shore, where the great blocks of chalk and greensand lying to a large extent on lias offer a most tempting prospect to the knight of the hammer. This series of sections and blocks extends for about half a mile along the coast, until the basalt once more comes down to the sea level at the cliffs of the Gobbins. The basalt of this neighbourhood is itself of more than usual interest, as it exhibits a curious banded structure on a large scale, seen very well along the escarpment facing the sea and in one little quarry which was passed on the way the amygdaloidal vesicles were very beautifully arranged in well-marked bands, between which was the ordinary half-rotten basalt, without amygdales. The Greensand was, however, the chief point of interest, and numerous fossils were obtained, though many more had to be left behind owing to the hardness of some of the blocks. Among the best finds was one of the energetic secretary of the geological section, Miss S. M. Thompson, which was a perfect specimen of a fossil sponge (*Ventriculites*) of unusually large size. Several other sponges of different genera and species were secured, these being a class that are in want of working out, as very little is known of the Irish ones. Other finds were numerous, *Cidaris* spines, some small corals and *Bryozoa*, and plenty of the ordinary greensand and fossils, such as *Rhynchonella*, *Spondylus*, etc. The Lias was in very bad order for working after the heavy rain followed by

the baking sun, and few fossils were taken. Botanists did not get anything worth speaking of, except the Adder's tongue (*Ophioglossum*), of which quite a large patch was seen. Tea at 6.30 on the cliffs at Hill's Port was the finale to a most delightful day's outing. Over these cliffs were driven in 1641 some of the natives by the heated soldiery from Carrickfergus, in retaliation for barbarities committed elsewhere in the name of religion.

Many thanks were due to B. D. Wise, C.E., for his kindness and courtesy to his fellow-members in making arrangements for this visit, and it was the only regret expressed that he has not as yet succeeded in his laudable efforts in making the path around the Gobbins. Its proximity to Belfast would make it of double value to the citizens as a half-day holiday resort. After tea, a pleasant walk through the fragrant bean fields of Islandmagee brought the party to Ballycarry and home by train.

10 July.

FIELD CLUB UNION CONFERENCE, GALWAY.

The Irish Field Club Union was inaugurated in the most successful manner by the joint excursion of which this report is a brief summary. The Union is the outcome of the various clubs holding excursions to the same places during the last two years, so it was thought that an excursion to some place of general interest might with advantage be taken by all together. This plan gradually crystallised out into the present arrangements, by which the following main points are carried out:—First, that a joint excursion be held yearly; second, that lectures on various subjects be interchanged; and third, that members of one club may be honorary members of all the rest.

The place selected for the excursion was Galway, for two main reasons; partly because it is one of the richest and most varied fields in Ireland for scientific work, and partly to try to form a Galway field club. The party of combined clubs

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was limited to 100, of which Belfast was allotted one half. On Wednesday, July 10, the Belfast contingent proceeded to Dublin, under the care of their secretaries, F. J. Bigger and A. G. Wilson. On arriving at Amiens Street Station cars were taken to the Gresham and Hammam Hotels, where arrangements had been made for their accommodation. Impedimenta having been disposed of, the party made their way by trains and cars to the gardens of the Royal Dublin Society at Glasnevin, where the Dublin Club gave them tea and a warm reception, after which F. M. Moore, the curator, most kindly conducted the party through the delightful grounds and glass-houses. These gardens and conservatories are considered to be in some respects superior to Kew, and certainly it would be hard indeed to surpass, for instance, the orchid, water-plants, or Killarney fern houses. No place could have been more favourable for a general introduction of the Belfast and Dublin members than the gardens. The evening was beautiful, and the tastefully-arranged plants looked at their best after the rain, exciting much interest in the large number of botanists present. Next morning at nine the members of both parties, together with representatives of the North Staffordshire Club, started by a special saloon train for Galway. After a quick run the "Citie of the Tribes" was reached at 12-30, when the rooms were at once portioned out at the great Railway Hotel alongside the station. As soon as this was done brakes were taken for the lunch at the Gentian Hill, three miles west of Galway, along the bay. After lunch members scattered over the promontory, which is composed of a very compact boulder clay, containing all the typical rocks of the district. It is interesting to the botanist as the only station west of Galway for the spring gentian (*G. verna*.) and the blue moor grass, of which specimens were taken. Other interesting plants were taken, of which, with all other botanical, geological, and zoological finds of the excursion, a full account appeared in the last September number of the *Irish Naturalist*, which is devoted entirely to a full and

technical account of this excursion. A special feature of Galway is the beautiful old fourteenth-century Collegiate Church of S. Nicholas, which has been carefully conserved, and affords many features of deep interest. It is doubtful if such another fine parish church exists in Ireland. The electric lights along the dark aisles and in the groined porch were certainly an innovation not expected. On the other side of the water from the town stands the Claddagh (Cladach sea-shore), where the women still wear the red petticoat and the blue swinging mantle, and the "blessing of the sea" takes place at the commencement of each year's fishing. The Claddagh has been a fishing station since the sixth century, and the curious boats probably embody many relics of ancient shipbuilding. After passing the afternoon in such a manner, the party reassembled to dinner at 7.30, and afterwards the clubs had the honour of receiving Dr. Moffat, president of Queen's College, Galway, and his colleagues, the High Sheriff, Hon. R. E. Dillon, Lieutenant-Colonel O'Hara, Marcus Lynch, D.L., and many other local gentlemen. The evening passed off very pleasantly indeed. Some of the gayer members indulged in an impromptu dance to the strains of a capital local string band that had been stationed on the balcony. Next morning (Friday, 12 July) breakfast was served at 8.15, the party setting out by special train at 9.10 to Recess, in the midst of the lake country, at the base of the twelve Bens of Connamara. It was in this immediate district that Frank Mathews lays the scene of his celebrated story of a Connacht faction fight, "Their Last Race." The party split into two sections, one of which went on the five miles' walk to Ben Lettery (1,904), one of the twelve Bens, the other going by way of the famous "marble" quarries to the top of a lower eminence at a distance of a couple of miles. The scenery of this district is most picturesque, the mountains being composed of sharply jointed white quartzite, whose hardness gives an exceedingly bold outline to the hills. The foot of the mountain chain is surrounded by bogs, dotted over with lakelets of all

shapes and sizes, which, with the Maam Turk Mountains in the background, form a lovely scene. It is among this quartzite that the crystalline limestone and dolomites occur, the best known of which is the Serpentine or Connamara marble, which is really a hydrated olivine, developed secondarily in the limestone by igneous intrusion. A section recently cut by the wire saw used in the marble quarry showed the character to perfection ; so photographs were taken of it. The whole district has been heavily glaciated, fresh surfaces being well seen in a cutting close to Recess station. The pure stone is said to be very valuable, the quarry owner informing members that he obtained £100 per ton for it. Many rare plants occur in this district, the following being the most noteworthy :—Alpine rue (*Thalictrum alpinum*), London pride, St. Dabeoc's heath, intermediate bladderwort (*Utricularia intermedia*), twigrush, the exceedingly rare pipewort (*Eriocaulon*), *Osmunda* and pillwort (*Pilularia globulifera*). Many other interesting plants were obtained. The entomology was also interesting, an exceedingly rare Spanish grasshopper being very abundant, also a rare dragonfly in some numbers. A small section of the party went shell-hunting at Portnafeadog, near Roundstone, and at the same time made arrangements for a longer stay there to work up the antiquities and general science of the district. This party was much indebted to the Rev. Canon M'Cormick, D.D., the local rector, who has done so much for this district ; his courtesy and attention were so considerable as to render it quite doubtful whether the members did not enjoy his society more even than the glories of this perhaps the most beautiful and interesting little town in all Connamara. The party returned by a special train to dinner at eight, after which an exhibition of the finds of the day was held, and much interchange of ideas took place. On the following day (Saturday) a special steamer started at 9.30 across Galway Bay for Ballyvaughan, in that part of North Clare known as the Burren. The most striking feature of the whole district is its extraordinary bleakness and barrenness.

Bare hills of terraced carboniferous limestone rise treeless on either side, appearing as though there was practically no vegetation ; but a closer search reveals a rich and varied flora growing mostly in the deep fissures and hollows of the jointed limestone. This flora includes, among many other rarities, mountain avens (*Dryas octopetala*), bloody cranesbill (*Geranium sanguineum*), Galium sylvestre, bearberry, wintergreen (*Pyrola media*), scale fern (*Ceterach officinarum*), and perfect sheaves of magnificent maidenhair fern, better by far than any seen in most hothouses. The roots are fortunately difficult of extraction, being sometimes three feet down a six-inch crevice. Lunch was served at two at Gleninagh, three miles from Ballyvaughan, close to the Holy Well and O'Loughlin's Castle and Church, and overlooking the sea. It is said this district was visited by one of Cromwell's captains, whose verdict was that there was not enough water to drown a man, nor wood to hang a man, nor ground to bury a man. The church was interesting on account of the curious hollow-built stone altar in which several skulls are kept ; in fact, the different niches of the building were decorated with these grim emblems of mortality. Behind the castle stands the Mountain of Cappanawalla (1,023 feet), which was scaled by many members anxious to combine botany with a splendid view. A large number of those present went on to Blackhead (six miles), where the best maidenhair is to be had. This day was the field day for the collectors of marine algæ, and the success of the day was judged by the amount of space occupied by those engaged in sorting out and mounting the spoil in the hotel in the evening after the late dinner. The interesting Mediterranean sea urchin (*Strongylocentrotus lividus*) was also found in vast numbers among the rock pools, with numerous *ophiuri*, or brittlestars. The geological results were on the whole uninteresting, consisting mainly of weathered corals and a few *Producti*.

On Sunday a good deal of sightseeing was done. The services in the churches were well attended, while some of the

members drove to Clare Galway Abbey, a fine Franciscan ruin, seven miles distant, which is very well worth visiting. After lunch the party split up according to their various tastes, some spending the afternoon at Queen's College, where the botanic gardens and museum were kindly placed at the party's convenience, the popular President, Dr. Moffat, and Mrs. Moffat hospitably receiving the visitors. A hearty Galway welcome was also given at Menlough Castle by Sir Valentine Blake, Bart., whose hospitality during the afternoon added much to the pleasure of inspecting so beautiful and ancient a castle and demesne. The Royal Galway Boat Club also gave the use of their fine boats to members, many of whom rowed to Menlough Castle, while others explored parts of Lough Corrib.

Monday was the big day of the trip, as a start was made at six a.m. from Galway docks by special steamer to Aranmore, the largest of the Aran Islands. About a dozen did not face the rough three hours' sea voyage, which, considering the early rising necessary, was very creditable to the enthusiasm of the members. On the whole, the weather was fine, and on landing at the harbour of Kilmurvey all expressed themselves satisfied with the meteorological arrangements, as a brilliant sun was shining. As soon as the steamer was stopped, she was instantly surrounded by a small fleet of the islanders' currachs or canvas canoes, which, combined with the shouting and gesticulation that went on in Irish, reminded the observer rather of what one sees and hears of in books of travel than of a scene in Ireland. More than half the party landed at this pier, while the rest proceeded on to Kiltonan Harbour. On landing, the first local industry noticed was one pursued mainly by the younger folk, that of selling samples of the articles in use on the islands; in fact, after about an hour or so, one fancies that the chief manufacture and export of the district is "pampooties," the primitive rawhide sandals of Celtic time, which are still in common use in these islands. After photographing groups of natives, pack horses, &c., a start was made for Dun Aenghus,

that marvellous ruin of Firbolgian times, which altogether outdates history, and remains the wonder and admiration of all who are fortunate enough to see what is one of the most remarkable of the old-world monuments of Western Europe. J. Johnston, the local magistrate, considerably opened his house and spread his table for the visitors. After thoroughly inspecting and photographing the triple rampart and *chevaux-de-frise*, the dun was left behind, many turning back after a short distance to see, what one hardly realises at first, that the cliff on which it is built is so steep that the natives fish into deep water, a distance of over 200 feet, while sitting within the enclosure! During the day the geologists noticed five or six species of coral, *Euomphalus loxonema*, a large *Orthoceras*, *Bellerophon*, and other fossils, but the rock is too hard to get satisfactory specimens. Botanists gathered the samphire in quantity, and also obtained a rare *Sedum*. A rare beetle, the rosechafer, was also in some numbers.

The numerous antiquities, including churches, cloghauns or beehive huts, carved crosses, holy wells, &c., were all visited by most of the party, under the guidance of the Rev. Father Colgan, P.P., but space admits of no description thereof, especially as they have all been so well tabulated on numerous previous occasions. The rare *Allium Babingtonii* perfumed the air in places with its strong and to most people unpleasant smell; but the crowning find of the day was the exceedingly rare grass known by the formidable name of *Calamagrostis epigejos*, of which quite a quantity was collected by energetic members. A smart shower of rain served its purpose in exhibiting the speed with which the pretty helix virgata swarms out in such weather, giving rise to the numerous stories of showers of snails.

As the evening drew on members gradually collected near the steamer at Kilronan, where a most ample lunch was spread out upon the rocks by Miss Gardner, of Dublin, and her assistants, who did so much throughout the excursion for the inward comfort of one and all. Here the different members

had the pleasure of thanking the Rev. W. Kilbride, the rector of Aran, and the Rev. Father Colgan and his curate for their guiding care and the valuable information they so freely bestowed.

After lunch the members visited Teampul Benan, on the southern end of the island, where the site of an abbey and the base of a round tower was passed. It was from the materials of this abbey and tower that Cromwell built the great fort still standing on guard at Killeany Harbour. A fair sea was running to the west of the island, dashing against the jagged rocks ; still the currachs of the bold islanders were seen here and there amidst the waves toiling for fish as if in smooth water.

The party set off on their return journey stored with a miscellaneous mass of information on manners and customs, botany, geology, scenery, and antiquities, of the like of which few on board had ever the smallest conception, and regretting only that there was not twice or three times the amount of time to spend in this unique and fascinating country. Galway was reached at eleven o'clock, and everyone retired soon, as next morning an early start was to be made.

Breakfast over, on Tuesday the 9.10 train for Oughterard was taken, and after a short journey brakes were mounted at that station and the majority made their way to a beautiful spot on the shores of Lough Corrib, near Carn Seefin, which was to be the rendezvous for the day.

A party of geologists, however, under the leadership of R. J. Kirwan, spent a couple of hours at the interesting section in the railway cutting just beyond Oughterard. This and the other new cuttings have been carefully described in a recent number of the *Irish Naturalist*. The extraordinary variety of rocks, including carboniferous limestone, quartzite, granite, hornblende schist, and other rocks, gave one a wonderful insight into the amount of contortion, upheaval, and general metamorphosis through which even this one little section has passed. Later in the day the lead and copper mines were

visited, and an interesting vein of garnet rock was examined. Botanists were in the majority, one of the best finds being the rare little orchis *Malaxis paludosa*. Pipewort, various *Droseras*, *Utricularia*, and many other local plants were again found in plenty, and entomologists secured a goodly quantity of material, reported in the special number of the *Irish Naturalist* above referred to. A small section of the members made their way to the shore of Lough Corrib, where Henry Hodgson, J.P., a local gentleman, very kindly placed his boats at their disposal, enabling them to cross to Inchanguoile and examine and photograph the celebrated ruined churches there, now carefully conserved by Lord Ardilaun.

After a comparatively easy day, the return train was taken at six, dinner was served at seven, and the Field Club Conference was held. Dr. Carpenter was in the chair, and after a short address, pointing out the advantages of the Union, and welcoming the English visitors, he called upon representatives of the various clubs to speak on any matter concerning the Field Club's wellbeing. William Gray, M.R.I.A., Professor Carr, and several other gentlemen spoke, perhaps the most important result being the passing of a resolution, proposed by Professor Fitzgerald, T.C.D., and seconded by Dr. M'Weeney, that natural science should be recommended to the intermediate examiners as a most necessary subject for examinations. Votes of thanks were then passed with great applause to the following:—President Moffat, Sir Valentine Blake, Bart., Galway Boat Club, R. J. Kirwan, and J. Johnston, J.P., for their courtesy and kindness during the excursion, and to the Great Northern Railway Company and the Midland and Great Western Railway Company for the special advantages afforded.

Next morning the party broke up, amidst expressions of deep regret at the termination of the excursion, and expressions of satisfaction at the pleasant time enjoyed and the good weather experienced, whilst fervent hopes were expressed that such another happy family of naturalists should meet again next year.

The tickets being available for fourteen days, many took the opportunity of seeing a little more of the country, so full of interest to naturalists and antiquarians.

29 July.

THE MOURNES.

The sixth excursion was held on the 29 July to the Mourne mountains, in conjunction with the London Geologists' Association, who were then visiting the North of Ireland. A party of about eighty arrived at Newcastle at 9-30, where breakfast was partaken of at Lawrence's rooms at the station. Breakfast finished, the brakes and cars were mounted, and the road taken to the Trassey Bridge. Here the machines were left, and the party proceeded up the valley to the Hare's Gap, close to which are the Diamond Rocks; these are great masses of Mourne granite, containing very numerous drusy cavities, some of them of considerable size. So often have they been visited by geologists that parts of the hillside bear quite a resemblance to a quarry. These cavities contain large and well-formed crystals of smoky quartz, orthoclase, biotite, albite, and less frequently of beryl, topaz, and microcline. Of all these many capital specimens were taken by the members, the topaz and beryl crystals being very good. From this point the party broke up into four divisions, one contingent walking back to the cars, another going round the flank of Commedagh to "the castles," which consist of the usual granite, whose subcolumnar structure in this part gives rise to vertical and horizontal jointing produced by shrinkage during the cooling of the mass. This jointing has been so increased and brought out by the action of wind and rain, snow, frost, and sun that the masses now present the appearance of huge bastions and fortifications of cyclopean masonry. A third section of the party walked up over Slieve Commedagh (2,512 feet), and a venturesome few even ascended Donard afterwards and observed

the remains of the rude stone cell where dwelt the anchorite Saint Domnard, after whom the mountain is called. These members brought down the report that the view was one almost unequalled, the horizon being so clear that no fewer than nine counties and the Isle of Man was plainly visible, the hills of Derry and Bray Head being both easily seen. This was the more extraordinary as the sky appeared cloudy. The last portion of the members remained at the Diamond Rocks, adding to their collections. The last three divisions met below the windy ridge, in the Glen Valley, noticing on the way the curious bared summit of the ridge, almost all the vegetation being blown away, leaving small patches of bog and large rounded stones and granite sand. The waterworn face of the cliff over which the river trickles is also well marked. The mountaineering members were interested in the sharp junction between the granite and the Ordovician stratum at the Shanslieve Spur, where the granite sends out veins into the shale. Basalt and eurite were also seen in contact here. The junction between granite and shale is also seen above Trassey Bridge and in the Glen Valley. The botanists, though not strictly on business, noticed most of the Alpine plants known to occur on these hills, and although several interesting ferns were obtained, no new find to the locality was recorded. Tea at the station was just finished in time for the 6.40 train for Belfast. Altogether the Mourne have seldom been seen to better advantage, and the English geologists expressed themselves more than pleased with the day, and the pleasure they derived from a visit to the Mourne, in conjunction with the members of the Belfast Naturalists' Field Club.

27 August

GLENARIFF.

On Saturday, the 27 August, a smaller party than usual left by the morning train for Glenariff. Changing at Bally-

mena, the narrow guage train was entered for Parkmore. Upon arriving there some little time was spent about the iron mines before the descent was made to the Glen. Here the members botanised a little, but largely gave themselves up to the simple enjoyment of the beauty of the gorges and the great waterfalls of Ess-na-lara (the fall of the mare) and Ess-na-croub (the fall of the hoof). After an evening in the tea house in the Glen, the party returned by the last train to Belfast.

14 *September.*

BRYANSFORD.

The last and perhaps the most enjoyable excursion of the season took place on Saturday, 14 September, to Bryansford, where, through the courtesy of the Earl of Roden, Tollymore Park was open to the members. On arrival at Newcastle, a dull morning was clearing off the Mourne, and the sun was coming out, brightening up what is one of the finest views in our district—the view of Donard from the Newcastle Railway Station. The walk to Bryansford was most enjoyable, with the great rolling hills lying to the south, and the wooded Glen of Tollymore in front, with the castle peering through the trees and the village church tower upon the hill. The day turned out so fine—as in fact all the Club's excursion days have this year—that all cloaks, &c., were left in the Roden Arms. In the Park dispersal was the order of the day, not more than two or three keeping together. Some took to the woods to collect fungi, others topped Slieve Commedagh, whilst the major portion loitered in the woods and down by the river, botanising, photographing, and generally enjoying the glories and beauties of nature as only students of her mysteries can.

Many of the members ascended the wooded hills south of the castle, already tinged with autumn tints, in order to see the glorious view of the hills stretching northward beyond Castlewellan. To the right on a hillcrest towered the great Norman

donjon keep at Dundrum, whilst opposite, the graceful spires of Castlewella guarded the well-planted Hill of Slievenaslat, with the castle of Lord Annesley nestling in the midst, whilst close at hand the walls of Tollymore glistened with crimson patches of Virginia creeper. A few members of the Art Society who accompanied the party sketched about the waterfalls. A hearty tea, comfortably provided in the Roden Arms, brought to an end the day's outing, leaving one and all satisfied with a day spent in the woods under the shadow of the Mourne Mountains.

During the day over sixty species of fungi, some of them edible, were collected by General Bland, the Rev. C. H. Waddell, and others, which included the following :—

Genus Agaricus, 18 species (including the following—*rubescens*, *muscarius*, *pantherinus*, *phalloides*, *fascicularis*, *rutilans*, *melleus*, *radicans*, and *disseminatus*).

Genus Cantharellus, 1 species (*C. cibarius*).

„ *Cortinarius*, 5 species (including *cyanopus*, *violaceus*, and *elatior*).

„ *Dædalia*, 6 species.

„ *Hydnum*, 1 species, (*H. repandum*).

„ *Hygrophorus*, 4 species (*bunicus*, *coccineus*, and *pratensis*).

„ *Lactarius*, 8 species (*vellereus*, *exsuccos*, *blennius*, *quietus*, *voleum*, *subdulcis*).

„ *Nyctalis*, 1 species (*N. parasitica*).

„ *Russula*, 9 species (*nigricans*, *emetica*, *sanguinea*, *Fæteus*, *lepida*, *olivacea*, and *integra*).

„ *Boletus*, 6 species (*Edulis*, *scaber*, *flavidus*, and *granulatus*).

„ *Polyporus*, 3 species.


The ferns were fairly representative, great quantities of the *Blechnum spicant* were observed everywhere, whilst *Lastrea filix mas* and its variety, *pseudomas* were found in different forms. *Lastrea æmula*, *oreopteris*, and *dilitata* were also observed, with several varieties of *Athyrium filix fœmina*. *Ceterach officinarum* was also found on a roadside wall, whilst W. H. Phillips met with the rare *Hymenophyllum Wilsoni*, a species of the Killarney fern.

WINTER SESSION

NOTE.—The authors of the various Papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

18 November.

SOCIAL MEETING.

HE thirty-third winter session of the Club was inaugurated in a successful manner by a conversazione on Thursday evening, 14 November, in the Exhibition Hall, when over 600 members and friends attended. Some graceful plants decorated the upper end of the hall adjoining the well-stocked conservatory, whilst the side hall was utilized for lantern displays. These annual social evenings of the Club have long been well known for their enjoyable way of exhibiting the work done during the year, and also because they give a wider opportunity to the less scientific members and visitors to learn a little practical science in an unusually acceptable way.

On this occasion the presence of some of the leading scientists from Dublin and the fact that microscopy in all its branches was the chief feature added greatly to the interest. On arrival at the hall at seven o'clock a refreshing cup of tea and its accompaniments were provided by the lady members, which lasted until eight, when the tables were cleared, and their space soon occupied with different exhibits. The business of the evening began by the President (F. W. Lockwood, C.E.) offering a hearty welcome to all present, and more especially to those who had come from Dublin to assist their friends and co-workers in Belfast. This over,

The President said he had a very pleasant duty to perform on that occasion in offering to William Gray, M.R.I.A., an album of local photos, with an address, as a token of the high esteem in which he is held by the Club and as a slight recognition of the valuable services to science which he had rendered for many years. The album and illuminated address were very artistically produced by Marcus Ward & Co., the photos being by R. Welch. The President called upon the Secretary to read the address, and the album was then presented to W. Gray amidst applause.

W. Gray briefly replied, saying he would ever value the presentation as another link connecting him with his many friends in the Field Club and Belfast.

One of the most valuable displays in the hall was the large series of views, antiquarian and scientific, taken by R. Welch during the past season, more especially those taken in Galway and Connamara on the occasion of the Field Club conference. For imparting instruction and artistic effect these photos could not be surpassed. This the most capable judges of such work freely admitted. Each department of the Club was in charge of some one or more members, around whom congregated a group of listeners, eagerly waiting an opportunity of seeing the microscopic slide, or animal, or whatever subject might be under discussion. At one table D. M'Ardle and the Rev. C. H. Waddell were in charge of their favourite mosses and liverworts, the combined exhibit of these two gentlemen being unequalled in this country. Close by, W. H. Phillips had the whole breadth of the hall covered with nature prints, taken from some of his famous ferns, and a table full of the ferns themselves. J. Hamilton's toads afforded a frightened interest to the ladies during the entire evening, whilst W. Gray's method of looking at the time through a beetle's eye brought up a feeling of wonder at such a lowly creature being provided with about 250 perfect lenses, through each of which the watch was visible. Joseph Wright had, in company with R. Welch, a fine collection of foraminifera from Connamara, from which 90 species had

been identified. H. Lyster Jameson⁷ of Dublin, had six out of seven known species of Irish bats ; also some shrew mice and field mice. Beside him J. Halbert, of Dublin, had an extensive collection of the rare insects collected at the Galway excursion, whilst arranged all around the central dais were the exhibits of the geological section. The polished blocks of Connamara and Menlough marble looked very well. R. Bell's trilobites, from Pomeroy, were a surprise to many, being so well preserved ; and J. MacLean's blocks of pure white gypsum were very handsome ; whilst Miss S. M. Thompson and W. J. Fennell had both varied and interesting exhibits of rocks and fossils.

On the large central table Professor T. Johnson was in charge of a collection of seaweeds, and showed the best method of examining them ; also a well-mounted series of Alpine plants. Professor M'Weeney, M.D., of Dublin, at the next table expatiated to a large and attentive crowd on a series of bacilli. The Doctor succeeded in enlightening his hearers about this little-understood subject, some of whom were scarcely satisfied that bacilli were harmless even when bottled. Professor Cole's Tardree rhyolites, illustrated by samples from all the other well-known rhyolites and obsidians, were full of interest, as were the paintings of sea anemones displayed on the walls by Professor A. C. Haddon, of Cambridge. Besides these special exhibits there was a miscellaneous list, including living *rotifers*, *hydrozoa* and *polyzoa*, rock sections, structure of animal and vegetable tissue, *echinodermata*, and many more. A small exhibit that aroused wonder among many was that of Alex. G. Wilson, hon. sec., of models of the Aran curragh and pack-saddle, and the primitive style of living in these islands, as exemplified by the raw-hide sandals and the simple form of lamps, one being a scallop shell.

Last and by no means least interesting was the table at the top end of the hall, presided over by four doctors, who were showing microscopic and other apparatus. Dr. Lorrain Smyth and Mrs. Smith had a collection of disease germs in bottles,

such as diphtheria and scarlet fever, which seemed rather risky to the uninitiated, and also a "Cambridge" rocking microtome, which was kept busy cutting sections during most of the evening. Dr. Thompson had a number of tests for colour vision and optical illusions in colour—one gentleman amongst those experimented on proved completely colour blind—also an ingenious method of measuring small spaces of time, and a pulse recording instrument.

Dr. Cecil Shaw's microtome came in for a good deal of attention, partly because it was engaged in the gruesome work of slicing a human eye.

Professor Symington's exhibit was an apparatus for drawing pictures of sections under the microscope, also the structure of nerve cells, with micro-photographs by J. J. Andrews, L.D.S.

The following members also showed the exhibits here detailed :—Rev. John Andrew, President of the Micro. Section, general subjects; Miss Mary K. Andrews, sections of rocks; J. C. Carson, microscopes and microscopical apparatus; J. H. Davies, specimens of flax injured by the rat-tailed maggot, larva of drone-fly (*Eristalis*), also specimens of the insect; W. D. Donnan, M.B., living specimens of infusorians and rotifers; W. B. Drummond, M.B., C.M., microscopic sections illustrating marine life; W. A. Firth, diatoms; P. F. Gulbransen, pond life; the Rev. H. W. Lett, A.M., structure of mosses and hepatics, with specimens; H. McCleery, Hydrozoa and Polyzoa; W. S. McKee, living illustrations of microscopic forms of fresh-water organisms; A. Speers, B.Sc., Lond., structure of vegetable tissues; James Stelfox, C.E., living illustrations of microscopic forms of fresh-water organisms; William Swanston, F.G.S., Echinodermata.

In addition to the microscopical exhibits there were two series of lantern displays, at 8-30 and 9-30, from photos taken on the Galway and other excursions. The first of these was described by W. Gray, and the second by W. J. Fennell, who pointed out the features of the pictures, which were excellently shown by Lizars' lantern. On each

occasion the side hall was crowded, and the views were frequently applauded. At ten o'clock a short business meeting was held, and seventeen new members elected, thus bringing to a close an enjoyable and instructive evening.

19 November.

On Tuesday, 19 November, the opening meeting of the Club was held in the Museum, when the President (F. W. Lockwood, C.E.) delivered his inaugural address. The President took as his subject "The Interdependence of the Various Branches of the Club's Work," and on rising was well received by those present. The address first touched upon the increasing prosperity of the Club, as indicated by the activity of the various sections, and though some of the older members had doubts as to the wisdom of the recent changes, he himself felt none. The President then referred to the different nature of the work done now to what was open to the students of thirty years ago, which necessitated sometimes a change in method. He then went on to show the dependence the various branches had upon each other. To take an instance, that pursuit which has brought the Club a very considerable reputation, microscopy, and more especially that branch so successfully pursued by Joseph Wright, F.G.S., the foraminifera, he (the President) thought it certain that J. Wright little considered his investigations into the white chalk powder in the flints would ultimately lead to discoveries necessitating careful reconsideration of the theories as to the origin of boulder clay. The resemblance between the valleys of Wales and Scotland and those of the Alps, and the shell-bearing beds such as Moel Tryfaen and other indications led investigators to go further afield, with ultimate results that we had to imagine a past in which the British isles figured as an archipelago, with all the mountain tops covered with perpetual snow and ice, the sea full of drifting bergs, and an "ice-foot" on the mainland similar to that of the Arctic regions. Following upon this came the Scottish school, headed by Archibald and

James Geikie, who conceded the submergence, but who contended that the most important part of the ice age was a land period higher than the present with a great ice cap, which rode over all the smaller channels, and formed a range of ice cliffs beyond the outer Hebrides. Such an ice cap covers the Antarctic continent, but the resemblance does not go so far as to allow us to say that the ice rode over channels, as there seems to be nothing of this kind at the South Pole. In Greenland the ice sheet comes down to the water's edge and sheds off great icebergs, which drift out to open sea; but, as Lieutenant Peary's interesting narrative shows, the ice only reaches the sea in the valleys, and the capes and headlands between stand out black and bare each summer, enabling him to trace the coastline and to separate island from mainland. The late Carvill Williams's theory of the glacial epoch goes further still, and pictures the ice sheet coming down from the north, over the Isle of Man, and carrying up the bed of the Irish Sea to deposit it on Snowdon and, as a terminal moraine, in the Midland counties. And here steps in the microscopist and proposes to settle the whole thing by the test of the foraminifera. Certainly where these are, the deposit is marine, and their not being found is only negative evidence; but if the universally marine origin of boulder clay be proved it will revolutionise modern theories upon that subject. The President then referred to the careful and minute work required in tracing out the erratic blocks to their parent formation. Broad questions of meteorology are well worth working at in order to help to solve such problems as why Greenland should be covered with an ice cap and Siberia quite dry. This seems, so far as has at present been worked out, to be mainly due to the one country being mountainous and causing precipitation of moisture, and to the prevalence of moisture-bearing winds. Physical geography is therefore a necessity to the proper study of these phenomena. The President next touched upon the engrossing subject of botany, and pointed out that, although such work as that done by Stewart, Corry, and Praeger cannot be done over again, very valuable results indeed could be

obtained from the almost unknown deposits of plant remains between the lava flows of the upper and lower basalts. Good work also remains to be done in tabulating these outflows, such as the rhyolites, pitchstones, &c. Referring to the work done by the Duke of Argyll, Starkie Gardner, and some of the Club's members, the President suggested that the fauna be especially searched for in those old lake bottoms. The Carboniferous period should also yield further results from the Tyrone and Ballycastle coal measures, and from the results of such exploration as this to form perhaps some idea of the ancient coast lines, and whether or not the main Continental outlines have ever been much as they are now.

The next point considered was archæology, including ethnography and the Celtic department, and the President suggested lines of work on the palæolithic remains and the ancient races of inhabitants of Ireland; whether traces cannot still be found of the almost unknown race of Iberians, as it is extremely unlikely that they were totally exterminated. Seeing that the Celt was not obliterated by the Saxon, nor the Saxon by the Norman in England, may not this race, and possibly another still more shadowy nation, have left their mark upon the land? It is even doubtful whether palæolithic men ever lived in Ireland at all. The President concluded by saying that he trusted he had said enough to show that there was plenty of work to do still, and that all branches of the Club were naturally interdependent.

Joseph Wright, F.G.S., rose in response to the President, and described his early experiences in searching for foraminifera, and concluded by criticising some of the arrangements with the Irish Field Club Union.

William Gray, M.R.I.A., gave a report of the meeting of the British Association at Ipswich, to which he went as a delegate from the Club.

19 *December.*

A meeting of the Club was held on Tuesday evening—the President (F. W. Lockwood, C.E.) in the chair—when the evening was devoted to geological subjects.

The President, after some introductory remarks in regard to the Larne gravels, called upon the first paper, by Miss Nora Steen, on “The Craiganogh Cave, County Antrim.”

Miss Steen described the discovery by Colonel Leslie of a cave in the grounds at Seaport, Bushmills, immediately below the fort mentioned by the Rev. James O’Lavery in his work on Down and Connor. Upon the removal of a stalagmite from the entrance the rest of the cave was found to be filled with enormous sea-worn stones. When these were removed, sand and broken bones, cemented by calcareous matter, were found. Professor R. O. Cunningham identifies the following animals :—Red deer, ox, sheep or goat, pig or wild boar, dog, wolf, or fox. Deer antlers have been found in the sandhills about a mile away, and Miss Steen suggested that the bones may have been thrown into the sea from the fort above and washed into the cave.

The next paper, by Robert Bell, was entitled “A Day Amongst the Silurian Shales of Pomeroy.” The essayist dealt with the results of a visit in July last. These shales are very interesting, being the nearest place where those characteristic palæozoic crustaceans, the trilobites, can be obtained. The rough fossiliferous grits, with marks resembling seaweeds and worm tubes, lie south of the granite hill of Bardahessiagh, and terminate abruptly, being unconformably overlain by more recent sandy beds. The trilobites occur in a section cut by the river near Dickson’s house and the slate quarry. The paper concluded with a list of the fossils found, which were on view during the evening.

Alex. G. Wilson, hon. sec., then gave a lengthened and carefully-prepared account of the geological investigations of the

members during the Galway excursion last July. Each day's work was carefully noted, and the results given, showing a considerable amount of observation and collection of specimens by the members. The lecturer's remarks were illustrated by a series of worked and fossil specimens, and by a set of beautiful lantern slides thrown on the screen by Lizars. These views were much appreciated, especially as they afforded an excellent opportunity for the pointing out of the different geological features of the district. The photos were taken by Fennell, Gray, and Welch, to whom the Secretary expressed himself as much indebted.

The President then called upon Miss S. M. Thompson, hon. sec. of the geological section, for "Notes on the Geological Excursions."

Miss Thompson commenced by drawing the attention of the audience to two geological works published during the year of special value and importance to Irish workers. One is the guide to the collection of fossils and rocks belonging to the geological survey of Ireland, written by A. M'Henry, M.R.I.A., and W. W. Watts, F.G.S., giving an epitome of the Irish rocks that occur in the four provinces. The other is written by Professor Cole, and forms an excellent handbook for all students of field geology, commencing with a chapter on the materials of the earth, many illustrations and examples being derived from our own neighbourhood, one of the chapters containing a picturesque yet very practical account of the geology of County Antrim.

The account of the excursions made by the geological section of the Field Club commenced with the month of March, and ended with the month of October, describing visits to Ballyholme, where the storm had opportunely destroyed the sea wall, and exposed the glacial and marine strata to the eyes of the geologists. The submerged peat in the centre of the bay gave rise to a description of the constant changes of level, which the general reader scarcely realises to be still going on, and is too apt to think of as a thing of the past. Glacial geo-

logy was not forgotten in the boulder clays at Ballyholme, and at altitudes of 1,000 to 1,400 feet on Divis and the Black Mountain, at glens near Larne, and in the great deposits extending so widely about the Carey River, near Ballycastle. It is an interesting and important fact that these boulder clays from such high levels should both contain foraminifera.

The much-debated point of the geological age of the rhyolites of Tardee and Sandy Brae caused sundry expeditions to be made to those somewhat inaccessible localities as well as to Templepatrick, to which special attention has been recently directed by A. M'Henry's paper in the "Geological Magazine," in which he shows good reason to conclude that the rhyolite had intruded between the upper and lower basalt periods. Professor Cole has been working amongst these lavas for a considerable time, and an instalment of the results has already been given. A careful and exhaustive analysis of the rhyolite worked out by A. Percy Hoskins, F.I.C., F.C.S., was also read (see page 310).

Palæontology was not neglected, the members having visited the ordovician strata of Donaghadee in search for graptolities; Woodburn and the Gobbins for cretaceous fossils; and Barney's point, at Islandmagee, for lower lias. The fossils and rocks collected on these excursions were shown, together with microscopic rock sections, photographs, pamphlets, and maps illustrative of the excursions. An allusion to the week spent in our district by the London Geologists' Association during the summer recalled this very successful joint day's excursion with the club to the Mourne Mountains. Some allusion to the club excursions, which were of geological interest, was followed by the description of an excursion to the very remarkable series of intrusive dykes on the coast of County Down, ending with a hasty visit to the quarries of splendid hornblende-granite near Castlewellan.

Lantern slides from photographs taken by Miss M. K. Andrews, and by W. J. Fennell, W. Gray, R. Welch, and J. St. J. Phillips illustrated the remarks.

This brought to a close a very interesting evening, ample time being afforded to the members for examining the different books and exhibits displayed upon the table

21 January, 1896.

A meeting of the Club was held on Tuesday evening, 21 January, in the Museum, when there was a good attendance. The President, F. W. Lockwood, C.E., briefly introduced the lecturer, George H. Carpenter, B.Sc., ex-president of the Dublin Naturalists' Field Club, who came to Belfast under the auspices of the Irish Field Club Union. The lecture was entitled "Our Plants and Animals: Old Inhabitants and New Arrivals."

The Lecturer dealt with some of the facts presented by the distribution of Irish plants and animals. After stating the pleasure it gave him to address the Belfast Club under the auspices of the Irish Field Club Union, he referred to the conference in Galway last July, and suggested that the assemblage of naturalists of different racial types on that occasion was parrallel to the remarkable mixture of distributional types to be found in Ireland. The lecture was illustrated by photographic lantern slides of animals and plants, maps of their distribution, and views of the places where they had been found. The lecture was frequently applauded, and the lantern slides illustrating it were shown by Lizars.

The President, in a few well-chosen words, spoke of the entertaining manner in which G. H. Carpenter had brought his interesting subject before the members, also the great benefit the different field clubs in Ireland derived from this interchange of lectures, the North with the South and *vice versa*

William Gray and Professor Symington also complimented the lecturer on his instructive discourse.

29 *January*, 1896.

A special meeting was held on the 29 January, when a lecture was delivered by William Gray, M.R.I.A., entitled "A Holiday Trip from Belfast to Galway by Sea and Land." This lecture was most exhaustive in its interesting details of the Galway Conference, elsewhere described in the account of the Galway excursion, and in the August number of the *Irish Naturalist*. The room was filled to overflowing, and the audience appreciative. The lecture was illustrated by a great number of lantern slides.

18 *February*, 1896.

On the 18 February, W. H. Patterson, M.R.I.A., read a paper to the club on "Gaelic Charms, Incantations, and Cures." The President, F. W. Lockwood, C.E., was in the chair. W. H. Patterson began his lecture by quoting some lines of the famous lorica or breastplate of S. Patrick, and showed how similar it is to prayers used by the Gaelic-speaking population of the Hebrides at the present day. A number of formulæ were also given for witchcraft, such as detecting it, learning it, and so forth; and the most gruesome of all charms—the "spancel"—described. This consists in taking a strip of skin from a corpse to tie on the person whose affections are desired; this was in use so recently as 1841. Another curious form of witchcraft was causing some animal to take up its dwelling inside a man, thus causing him to be ravenously hungry. Many remarkable legends are told of cures performed by S. Columba, such as an issue of blood being stopped, and the series of cures effected by the blessed pebble. Stones are often invested with powers of healing, numerous instances being given, the most remarkable being S. Molingue's globe. Another strange method of curing swellings was the apportioning of parts of the tumor to various hills, when the lump gradually decreased. W. H. Patterson

went on to give a considerable number of charms and spells for affections of the body, such as erysipelas, strains, and toothache, many of them being very laughable—for instance, to cure a sty in the eye, rub it with the tail of a black cat. Spiders were also most valuable as medicine. The lecture was attentively listened to by a good audience.

17 *March*, 1896.

A meeting was held on the evening of S. Patrick's day, when Professor Grenville A. J. Cole, M.R.I.A., F.G.S., President of the Dublin Field Club, read a short paper, entitled "A General Account of the Rhyolites of Co. Antrim, with lantern illustrations of other Rhyolitic areas in the British Isles"; after which the evening was devoted to a display of Microscopical objects.

The following is a list of the exhibits and exhibitors:—Rev. John Andrew, rock sections; F. De V. Kane, A.M., pterocotyle palmata and pedicellariae W. dorocideris papillite; J. J. Andrew, L.D.S., micro-photographs; Miss M. K. Andrews, rock-forming minerals; Miss S. M. Thompson and Mrs. Blair, rock sections; J. O. Campbell, B.E., leucitic lava and other igneous rocks; W. B. Drummond, M.B., microscopic forms of marine life; W. D. Donnan, M.B., (1) fresh water algae, (2) free-swimming rotifers; P. F. Gulbransen, (1) living animalculae, (2) various forms of pollen; W. A. Firth and Lakes Roscorla, diatoms; James Murdoch, plant structures; William Gray, M.R.I.A., and A. M'J. Cleland, miscellaneous; James Stelfox and W. S. McKee, living rotifers; J. Lorrain Smith, M.D., pathogenic organisms; Cecil Shaw, M.D., and H. M'Cleery, pond life; Joseph Wright, F.G.S., pelagic foraminifera. There was a large attendance, and much interest taken in the exhibits.

ANNUAL MEETING.

The thirty-third Annual Meeting of the Club was held in the Museum on the 21 April—the President in the chair.

The Secretary read the Report of the year's work (see page 263).

The Treasurer read the statement of accounts (see page 267).

These two items were passed unanimously.

On the motion of Wm. Gray, seconded by S. A. Stewart, Rules 6 and 11 were added to the Rules of the Club, and slight alterations were made to Rules 5 and 8.

The Election of Office-bearers was then proceeded with.

On the motion of F. W. Lockwood, seconded by Jos. Wright, Lavens M. Ewart, J.P., M.R.I.A., was elected President. On the motion of Francis Joseph Bigger, seconded by Wm Gray, the Rev. C. H. Waddell, B.D., was elected Vice-President. On the motion of W. H. Patterson, the Honorary Secretaries were re-elected. The Treasurer and Librarian were re-elected, on the motion of Alec. G. Wilson, seconded by R. J. Welch. The following Members of Committee were then proposed by the Rev. John Andrew, seconded by J. C. C. Payne, J.P., W. J. Fennell, William Gray, John Hamilton, F. W. Lockwood, J. St. J. Phillips, S. A. Stewart, Miss S. M. Thompson, John Vinycomb, Robert J. Welch, Joseph Wright.

The Reports of the Microscopical Section (see page 301), the Geological Section (see page 302), and the Botanical Section (see page 310) were then presented.

REPORT OF MICROSCOPICAL SECTION.

The Committee of the Microscopical Section of the Field Club beg to report that now at the close of another Session, this Section continues to exist in a fairly prosperous condition.

Owing to the inherent difficulties connected with the carrying on of Microscopical field work, it was decided not to attempt any Excursions last Summer, but it is hoped that some progress

will be made in this important branch during the ensuing season.

At the Annual Social Meeting of the Club, the members of this Section, with the aid of a number of their Dublin brethren, contributed largely to the success of the evening by a representative display of both microscopical work and apparatus.

During the Winter Session two Sectional Meetings have been held.

On the 13 of December, Dr. Lorrain Smith delivered a most interesting address on the Study of Bacteriology, illustrated by a number of excellent micro-photographs projected on the lantern screen.

At the Second Meeting on the 5 of March, the Rev. John Andrew, President of the Section, gave a short but very practical paper on the Preparation of Rock Sections, beginning with the rough material and ending with the finished slide.

Dr. Drummond contributed another short paper entitled Hints on collecting Marine Zoological Specimens, in which he most lucidly and graphically explained the methods of collecting and preserving the microscopical fauna of the ocean.

A number of beautiful Rock Sections belonging to Charles Elcock were exhibited by P. F. Gulbransen and E. Blair, and James Stelfox and W. S. M'Kee showed the entrancing Rotifer *Melicerta* in all its glory.

Your Committee would urge, especially on the younger members, the necessity of taking up some one branch of microscopical science, and of working at it in a systematic and determined manner, so that the Section may show actual results by adding to the lists of the fauna and flora of our country.

W. D. DONNAN.

REPORT OF GEOLOGICAL SECTION.

It is impossible to commence the report of last year's work without adverting to the benefit derived from the new rooms

in the rear of the Museum, recently acquired by the Club. This acquisition has enabled the Section to hold evening meetings once a month, which have proved useful and interesting ever since their commencement last June. The lower room contains a large set of drawers kindly placed at the disposal of the Club by the Natural History and Philosophical Society, in which the collection of Irish rocks and erratics accumulated during the three years of the Section's existence are now placed. The collection still increases, giving interesting proof of the marvellous variety, especially of igneous rocks that are found in the North of Ireland. Some welcome specimens from more distant Irish localities have also been received. Among the specimens given by William Swanston last year are two specimens of biotite rhyolite of great interest, indicating an eastern locality for this lava not known before, having been found by him near Orlock Point some years ago as a dyke in the Ordovician rocks. Wm. Swanston promises further to investigate the subject of his valuable discovery. A recent visit in search of this dyke by Robert Bell and the Secretary failed to find it, but two other dykes were noticed, one being the common "mica trap" of older writers, the other of a mica-aphanite which Prof. Cole described as closely resembling a rock intrusive amongst the ancient rocks at Assynt in Sutherlandshire. The Section feels much indebted to Miss M. K. Andrews and R. Bell for valuable assistance rendered in trimming, mounting, and labelling these collections contributed by the various Members of the Section. R. Bell has also contributed the first rock section for the microscope as yet received. The Rev. John Andrew has presented his valuable set of prize slides illustrating geological subjects.

GLACIAL GEOLOGY.

In the report of the Erratic Blocks Committee of the British Association (1895), the glacial work done by the Club receives favourable mention as regards results, and as being the first

report furnished from Ireland. During the last twelve months some interesting facts have occurred. Foremost comes R. Bell's discovery of mammalian remains, consisting of a portion of a skull with one horn attached, and a dorsal vertebra with neural spine. The remains were shown to Professor A. C. Haddon who pronounced them to be ox bones, and recommended submitting them to E. T. Newton, F.R.S., Jermyn Street Museum. E. T. Newton reports that the skull has a longer horn-case and is broader across the forehead than any *Bos longifrons* he is aware of, but would do for a modern variety of *Bos taurus*, that it might possibly be a small form of *Bos primigenius*, but it would be very unsafe to refer it to that fossil genus. There is no indication of any disturbance of the section, and the horn only protruded an inch and a half from the solid face of the clay, seven feet below the surface (the section varying from 15 to 20 feet, resting on Trias.) S. A. Stewart and the Secretary subsequently visited the brickfield, and a bag of clay was obtained from the point where the bone occurred, and has not yielded any marine organisms. These boulder clays extend for miles along the Lagan valley, yet, considering the surprising way in which extraneous objects may be introduced into apparently undisturbed deposits, further discoveries would be desirable to establish the existence in boulder clay of mammalian remains.

A fine *Lima gigantea*, well polished and scored, was found on the Bog meadows, and a well glaciated piece of Carboniferous coral was picked up in a brickfield at Oldpark Road, Belfast, 200 feet above sea.

ERRATICS.

The origin of boulder clay still continues to be the battleground of glacialists. Professor Bonney has pointed out that its inclusion of marine organisms is not conclusive, as the alternative theories of submergence or of glaciers passing over the sea-bottom, including it and carrying it to higher levels,

both postulate the occurrence of marine fossils. Modern glacial geology devotes itself steadily to the distribution of the erratics contained in the clays. Alec. G. Wilson has further extended the range of erratics of riebeckite eurite so familiar to the Club as "Ailsa Craig rock," as far westward as Kenbane Head and White Park Bay, as well as in the gravels of Ballylessan, and by J. O. Campbell, to the flanks of the Spinkwee Mountains. Amongst 71 unknown erratics submitted to A. M'Henry, M.R.I.A., Geological Survey, Ireland, for identification, 16 were Scotch, whilst 31 others were noted as being either Scotch or Irish. Analysing the list more fully gives 3 diorites, 2 felsites, and 5 other rocks from the Clyde area; 2 grits from Cantyre, a breccia from Cantyre or Arran, the Girvan area contributing two Silurian rocks (one containing a *Trilobite* and other fossils), and a pegmatite vein rock. 6 of these Scotch erratics were found at Ballyholme Bay, one at Neill's Hill, one on the shore at Donaghadee, another occurs as a large boulder on the Down coast, north of Glasdrumman Port. In County Antrim, one was found on the shore of Islandmagee, 4 in a brick-field on the Limestone Road, Belfast, and one in those at Woodvale and Oldpark. Such interesting results show what can be done by the section literally at their doors, Robert Bell having specially studied the brickfields of Belfast. The Section will note that these were unfamiliar rocks, numerous records having been made of other well-known Irish rocks. These records are, as usual, tabulated in the schedule prepared for the purpose by the Section and preserved for future reference.

A list of the larger erratic boulders is given below :—

XII.—BANGOR AND BALLYHOLME.

(Continued from last year's report.)

Boulder clay at sea level. 100 boulders gave 45 erratics, several from Scotland, some Irish or Scotch, some from Down and Antrim.

XIII.—DIVIS MOUNTAIN.

Boulder clay on upper reach of Crow Glen river, very hard, packed with angular fragments. 100 boulders gave 52 chalk, 38 basalt, and 10 flints. 2 gatherings contained (when examined by J. Wright, F.G.S., yielded 2 fry of mollusca *Buccinum undatum* and *Littorina littorea* (?)) the foraminifer *Nonionina depressula*, and 6 ostracoda too young for identification. 1300 to 1400 feet O. D.*

XIV.—BALLYVOY, NEAR BALLYCASTLE.

The localities visited were a bank of boulder clay on the stream at Calhame, and the high banks of Ballypatrick Glen. Considerable interest attaches to these deposits, as they contain rocks from points several miles to the south, the Tornamoney eurite being not uncommon, and specimens from Cushleake and Cushendun also occurred, mingled with the Ailsa type of riebeckite eurite, and other rocks from Antrim or possibly Cantyre.

XV.—BELFAST BRICKFIELDS.

(Average level above sea 200 feet.)

In addition to the usual rocks that occur in our boulder clays the following lists are of interest :—

A. Limestone road sections. 5 from Girvan and Clyde area, others doubtfully Scotch or Irish, Lower Lias, etc.

B. Old Park sections. Riebeckite eurite (Ailsa type). Eurite and dykes of Mourne district, rocks from Cushendall and Cushendun.

C. Springfield sections. Rocks from Metamorphic area of N. Antrim, Tornamoney and Cushendun, Riebeckite eurite (Ailsa type). Cultra and Mourne district.

D. Woodvale sections. Rock from Clyde area. Micraster and belemnite.

E. Ardoyne sections. Cushendun, Cushleake, N. Antrim or Pomeroy rocks, Lower Lias, etc.

F. Annadale sections. Six rocks that may be from N.

* B.N.F.C. Proceedings, 1894-95, page 215.

Antrim or the Clyde, also Cushendall and Cushendun rocks, Riebeckite eurite (Ailsa type) and rocks from Cultra.

XVI.—GLENOE, NEAR LARNE.

Boulder clays overlying chalk in quarry. Lowest layer blue, with many fragments of Lower Lias Shales. Upper layers red and partially stratified. Lias beds occur (see geol. map) on these heights (300 ft. O. D.) as well as at sea level in Larne Lough.

LARGE ERRATIC BOULDERS.

(These numbers follow consecutively those of previous years.)

13. Chalk, 4 ft. 8 ins. x 3 ft. x 6 ins., from boulder clay overlying Trias near Forth River, Belfast. Rounded, smoothed, and scored. Weight 8 cwt.

14. Basalt, 7 ft. x 6 ft. 6 ins. x 4 ft. In field near Templepatrick station. Rounded. Weight $13\frac{1}{2}$ tons.

15. Olivine dolerite, 3 ft. x 3 ft. x 8 ins. Boulder clay over Trias. Woodvale, Belfast. Sub. ang. Weight $\frac{1}{2}$ ton.

16. Olivine dolerite, 4 ft. x 3 ft. x 2 ft. On Trias at Annadale, Belfast. Rounded. Weight 2 tons.

17. Basalt, 10 ft. x 7 ft. 9 ins. x 6 ft. 3 ins. On Trias on eastern shore of Islandmagee. Sub. ang. Weight 39 tons.

18. Riebeckite Eurite (Ailsa Craig type), 1 ft. 4 ins. x 13 ins. x 10 ins. (Same locality as No. 17.) Weight 2 cwt.

19. Basalt, 4 ft. 6 in. x 4 ft. x 3 ft. In Ballypatrick Glen, near Ballycastle. Weight $4\frac{1}{2}$ tons.

20. Basalt, 9 ft. x 6 ft. x 4 ft. Same locality. Weight 18 tons.

BOULDER CLAYS.

*(Examined for microzoa by Miss Smythe.)**

CAVE HILL.—From hollow behind M'Art's Fort. Specimen obtained in 1894 gave several species of foraminifera and ostracoda. Specimen of 1895 less richly fossiliferous. O. D. 1100 feet.

*Miss Smythe has prepared slides from these high level clays and from Bradshaw's Brae Clay.

KNOCKBRECKAN.—No organisms found.

BRADSHAW'S BRAE.—Contains what appears to be cases of *larvæ*.

Upper part of Collin Stream on BLACK MOUNTAIN.—No organisms found.

LARNE HARBOUR.—Contains broken shells and foraminifera.

BALLYHOLME BAY.—Contains broken shells and foraminifera.

EXCURSIONS AND MEETINGS.

A short account of the Geological Excursions of the past season was given by the Secretary at the Club Meeting in December, which was devoted to Geological Papers. As these excursions, and the evening meetings of the section have been fully reported in the "Irish Naturalist" and our local Papers, it is unnecessary to give more than a list of localities and dates. The weather this year was so favourable that all excursions were carried out, whereas in the previous year, eight were prevented by heavy rain. The Meeting of the Irish Field Club Union at Galway introduced the Section to the oldest Granite area in Ireland, and was closely followed by the visit of the London Geologists' Association to our district, when many of our members took part in the week's excursions. It is to be hoped that on a future occasion this friendly intercourse may be renewed.

LIST OF EXCURSIONS.

23 March—Bangor and Ballyholme.

6 April—Divis (Glacial).

16 „ —Tardree and Sandy Braes.

4 May—Donaghadee.

11 „ —Ballyholme (Glacial).

25 „ —Woodburn.

8 June—Ballycastle (Glacial).

22 „ —Barney's Point.

31 Aug.—Dykes on Mourne Coast and Castlewellaan Granite Quarry.

26 Oct.—Templepatrick Quarry.

PAPERS.

The following Papers were read to the Section during the Winter :—

Dec. 11—Some Notes on the Tarns of the Mourne Mountains—F. W. Lockwood, C.E.

A day among the Silurian Shales of Pomeroy—Robert Bell.

Jan. 8—Notes on a recent visit to Dungiven, and on the porphyritic rhyolite of Hillsborough—Alex. G. Wilson.

Jan 25—The Glacial series at Belfast and Dublin—a contrast—R. Lloyd Praeger, M.R.I.A

Feb. —The Polarization of Light and its application to Micro-petrography—J. O. Campbell, B.E.

April 1—Report of Geol. Section for 1895—6—The Secretary.

The Altels Avalanche—11 Sept., 1895—Miss M. K. Andrews.

PROFESSOR COLE'S CLASSES.

For the third time the Section has benefitted by the instructions of Professor G. A. J. Cole, who devoted a week to the Club, conducting in the day a series of field excursions, whilst a Petrographic Class of 12 students met each evening for the study of rock sections and rock-forming minerals under the microscope. Fine weather favoured the course, and the list of places visited is appended. The evening class resembled a "special course" at the Royal College of Science, and was a valuable opportunity for the Section, which it is hoped may be continued next year. The following is the list of his field excursions :—

18 March—Cave Hill and Squire's Hill.

19 „ —Stewartstown.

20 „ —Dundonald and Scrabo.

21 „ —Sandy Braes and Tardree.

22 „ —Islandmagee and the Gobbins.

24 „ —Coast near Newcastle and Thomas Mountain.

The thanks of the Section are due to Professor Cole for 6 reprints of papers on Irish Geology and for the microscopic examination of rock specimens, more especially those suspected of containing riebeckite ; to A. M'Henry, M.R.I.A., for the determination of a large number of erratics and for a copy of

the "Guide to the collection of rocks," etc., written by him in conjunction with W. W. Watts, F.G.S.; to — Herries, F.G.S., for report of Geological Association Excursion to Ireland; R. M. Young, M.R.I.A., for 2 diagrams of sections at Ballyholme Bay (now hidden by sea-wall); to P. F. Kendall, F.G.S., for report of Erratic Blocks Committee (British Association), 1895; also to W. W. Watts, F.G.S., Jermyn Street Museum, for obtaining specimens of the Riebeckite Eurite, found at Skye and Ailsa Craig, from the Geological Survey Collection. Slides are in preparation from these specimens. Also to Miss Smythe, of Carnmoney, for examination of boulder clays for microzoa, J. Wright, F.G.S., being unable to continue these examinations owing to pressure of other scientific work.

The following analysis of the Cloughwater Rhyolite has been kindly made by A. Percy Hoskins :—

SiO_2	...	75.97	75.90	
Fe_2O_3	...	2.54		} 18.12
Al_2O_3	...	15.29		
CaO	...	1.15		
MgO	...	0.24		
Na_2O	...	2.86		
K_2O	...	3.89		
H_2O	...	0.57		
			102.51	

S. M. THOMPSON.

REPORT OF THE BOTANICAL SECTION.

This Section was formed with the object of trying to maintain the interest awakened in Botany by the interesting course of lectures of Professor Johnson during the Spring of 1895.

It was hoped that it might be the means of drawing together those who were interested in the subject, and especially of helping on the younger members to devote themselves to this attractive science. At the Monthly Meetings held during the

past session opportunities were afforded not only for the reading of papers and notes, and discussion of difficulties, but also for the naming of specimens brought in by the members. These objects have been to a large extent accomplished, and the attendance at the Meetings and interest awakened has been encouraging.

Five Meetings have been held in the Club Rooms during the Winter with an average attendance of about thirteen.

A portion of each evening was devoted to studying the minute structure of plants, but it was found difficult to make this as profitable as it might have been, so few of those present having microscopes.

The rest of the time was taken up with systematic botany, and papers were contributed on the following subjects—Ferns, Duckweeds, Casuals.

It is hoped that the Members of the Section may be encouraged to do much practical work at Club Excursions and elsewhere during the coming season, and especially to compete for some of the Club prizes. Mere collecting is in itself of no great benefit, but it has often been found that the trouble taken and interest awakened in forming a classified collection of some group of plants has resulted in a permanent and ever increasing interest in the study.

C. H. WADDELL.

R U L E S

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the object of the Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall first pay an entrance free of 5/-, and be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of the votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club; and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Librarian, and two Secretaries, and ten Members, who form a Committee, and shall hold not less than eight Meetings in the year. Five Members to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

The Committee may from year to year appoint a Sectional Committee as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six Members of the Club, not less than two being members of the Club's Committee. No financial responsibility to be incurred by the Sub-Committee or any officer of the Club without the previous approval of the Club's Committee. Any Sub-Sectional Committee may elect its own Chairman and Secretary from its members.

VII.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VIII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to be original and to treat of the Natural History and Archæology of the district, These Meetings to be held during the months from November to April inclusive.

IX.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collections of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

X.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

XI.

Members of other Irish Field Clubs residing temporarily or permanently in or near Belfast may be enrolled members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year on production of a receipt showing that such

subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XII.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subject mentioned in such written requisition.

XIII.

That the Committee may be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its members by such other societies.

NOTICE.

EXCHANGES OF PROCEEDINGS.

Bath—Natural History and Antiquarian Field Club.

Proceedings, Vol. VII., No. 2.

Belfast—Natural History and Philosophical Society.

Report and Proceedings, 1884-85.

„ Ulster Journal of Archæology.

Vol. II., Parts 1, 2, and 3.

Berwickshire—Naturalists' Club, Vol. XV., No. 1.

List of Members, 1895, &c.

Brighton and Sussex Natural History and Philosophical Society.

Abstract of Papers and Library Catalogue.

Cardiff—Naturalists' Society.

Report and Transactions, Vol. XXVII., Part 1.

Costa Rico—Instituto Fisics-Geografico Nacional.

Anales Tomo V., 1892.

„ Museo Nacional de Costa Rico, Informe presentado al senor Secretario de Estado en el despachs de Fomento.

Dublin—Royal Irish Academy.

Proceedings, 3rd Series, Vol. III., No. 2-4.

Transactions, Vol. XXX., Parts 11, 12, 15, 16, 17.

„ Royal Society of Antiquaries of Ireland.

Journal, Vol. V., Parts 2, 3, 4.

Dumfries and Galloway—Natural History and Antiquarian Society.

Journal and Proceedings, 1894-95.

Edinburgh—Geological Society.

Transactions, Vol. VII., Part II.

Frankfort—Helios.

Jahrgang 13, Nos. 1 to 6.

„ Societatum Litterae.

Jahrgang IX., Nos. 4 to 9.

„ Senckenbergische naturforschende Gesellschaft
Bericht, 1895.

Glasgow—Natural History Society.

Transactions, Vol. VI., Part 1.

„ Philosophical Society.

Proceedings, Vol. XXVI.

Halifax, N.S.—Nova Scotian Institute of Science.

Proceedings and Transactions, Vol. VIII.

Hamilton Association.

Journal and Proceedings, No. XI.

Hertfordshire—Natural History Society.

Transactions, Vol. VIII., Parts 6 and 7.

Liverpool Geological Society.

Proceedings, Vol. VII., Parts 1 and 3.

London—Geologists' Association.

Proceedings, Vol. XIV., Parts 3 to 7; list of Members.

„ British Association for the Advancement of Science
Report, 1895.„ Reliquary and Illustrated Archæologist.
Vol. I., Nos. 3—4; Vol. II., Nos. 1—2.

Manchester—Field Naturalists' and Archæologists' Society.

Report and Proceedings, 1894.

„ Microscopical Society.
Transactions, &c., 1894.

Marlborough—College Natural History Society.

Reports, Nos. 43 and 44.

Mexico—XI Congreso de Americanistas.

Programa, 1895.

Oldham—Microscopical Society.

Reports, 1893, '94, '95.

Catalogue of Books.

North Devon Mosses.

St. John's, N.B.—Natural History Society.

Bulletin, No. XIII.

Rochdale—Literary and Scientific Society.

Transactions, Vols. II., III., and IV.

Annual Report, 1895.

Stavanger—Museum.

Aarsberetning for 1894.

Sheffield—Naturalists' Club.

Annual Report, 1894.

Wiltshire—Archæological and Natural History Magazine.

Vol. XXVII., Nos. 83 and 84.

Wiltshire—Inquisitions post Mortem, Charles I., Part III.

U.S.A.—Boston Society of Natural History.

Proceedings, Vol. XXVI., Part VI.

The North American Brink, by Outram Bangs.

„ California—Academy of Sciences.

Proceedings, Vol. IV., Parts 1—2; Vol. V., Parts 1—2.

„ Chapel Hill, N.C.—Elisha Mitchell Scientific Society.

Journal, Vol. XI., Part 2; Vol. XII., Part I.

„ Chicago—Academy of Sciences.

Bulletin, Vol. II., No. 2.

Annual Report, 1895.

„ Colorado—College Scientific Society.

Fifth Annual Publication.

„ Massachusetts Tuft's College.

College Studies, No. IV.

„ Milwaukee Public Museum.

Annual Report, 1895.

„ New York—American Museum of Natural History.

Bulletin, Vol. VI. and VII.

Annual Report, 1894.

„ Philadelphia—Academy of Sciences.

Proceedings, 1894, Part 3; 1895, Parts 1, 2, 3.

„ Portland—Society of Natural History.

Proceedings, Vol. II., Part 3.

„ Rochester—Academy of Science.

Proceedings, Vol. II., brochure 3, 4.

U.S.A.—Salem—American Association for the Advancement
of Science.

Proceedings, 1894.

„ St. Louis—Academy of Science.

Transactions, Vol. VI., No. 18 ; Vol. VII., No. 1, 2, 3.

„ Staten Island—Natural Science Association.

Proceedings, Vol. IV., Nos. 17—20 ; Vol. V., No. 1—7.

Staten Island Names.

„ Washington—Smithsonian Institution.

Report, 1893.

„ „ United States Geological Survey.

Annual Report, 1892—93, Parts I., II.

From the Author.

The History of Mount Mica, Maine, U.S.A., by Augustus
Choate Hamlin, Maine, 1895.



BELFAST NATURALISTS' FIELD CLUB.

THIRTY-FOURTH YEAR, 1896-97.

LIST OF OFFICERS AND MEMBERS.

President:

LAVENS M. EWART, M.R.I.A.

Vice-President:

THE REV. C. H. WADDELL, B.D.

Treasurer:

W. H. PHILLIPS,
8 CHICHESTER STREET.

Librarian:

WILLIAM SWANSTON, F.G.S.,
QUEEN STREET.

Committee:

W. J. FENNELL.

WILLIAM GRAY, M.R.I.A.

JOHN HAMILTON.

F. W. LOCKWOOD.

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ANNUAL REPORT AND PROCEEDINGS
OF THE
BELFAST
NATURALISTS'
FIELD CLUB

For the Year ending 31st March, 1897.

(THIRTY-FOURTH YEAR.)

SERIES II.

VOLUME IV.



PART IV.

1896-97.

Belfast :

PRINTED FOR THE CLUB

BY ALEXANDER MAYNE & BOYD, 2 CORPORATION STREET.

PRINTERS TO QUEEN'S COLLEGE, BELFAST.

1897.

REPORT.

THE Committee of the Belfast Naturalists' Field Club now lay before the Members their Thirty-fourth Annual Report. During the past Session the general work of the Club has been continued as usual, whilst the Geological and Botanical sections have done special work in their own departments. As was anticipated, the entrance fee has had the desired effect of keeping the membership within reasonable bounds, it now stands at 450, all members in arrears with their subscriptions having been struck off the roll.

During the past summer the following excursions were held :

Armoy,	..	..	..	..	23 May.
Salt Mines,	..	..	..	..	6 June.
Glenarm,	..	..	..	..	20 June.
Dredging Expedition,	..	..	..	..	4 July.
Cavan,	..	..	..	..	10, 11, 12 & 13 July.
Slievegallion,	..	..	..	..	15 August.
Slievicroob,	..	..	..	..	29 August.

The winter meetings were as follows :—

- 27 Oct., 1896. Social Meeting.
- 17 Nov., „ Opening Lecture by William Gray, M.R.I.A.—The Origin and Present Condition of the Giant's Causeway.
- 15 Dec., „ The Elemental Basis and Progressive Build of the Inorganic World—Rev. J. Andrew.
- 27 Jan., 1897. Fresh-Water Algae—W. D. Donnan, M.B. Discovery of a Souterrain at Stranocum—Francis Joseph Bigger and W. J. Fennell.
- 16 Feb., „ Geological History of Plants—Rev. Charles H. Waddell, B.D. Alien Plants—Richard Hanna.
- 16 Mar., „ The Re-discovery of the Plant *Dryas Octopetala*—Rev. H. W. Lett, A.M., M.R.I.A. An Evening with the Microscope—Hamilton M Cleery.
- 13 April, „ Annual Meeting.

The average attendance at the excursions was fair, only one—Salt Mines—being too large to work properly. The attendance at the winter meetings was good. A Public Lecture under the auspices of the Club was given by Professor Cole, in the Grosvenor Hall, on 29th March, under the chairmanship of the Lord Mayor, when there was a very large attendance. This lecture was followed by a week's geological work in the field, with lectures. The reports of the different sections will be found in the report of the Annual Meeting.

Your Committee would again press upon the members the absolute desirability of each of them undertaking some individual work. The Club work can only be carried on with scientific credit by active workers and not a plethora of mere members.

The best thanks of the Club are due to the Railway Companies for the facilities of travel afforded to the members, to the Press for their lengthened reports of the Club's proceedings, and to all others who have extended a helping hand for the carrying on of the Club's work.

FRANCIS JOSEPH BIGGER,

ALEX. G. WILSON,

Hon. Secs.

THE TREASURER IN ACCOUNT WITH THE BELFAST NATURALISTS' FIELD CLUB.

Dr.

For the Year ending 31st March, 1897.

Cr.

To Balance ..	..	£0	5	2	By Expenses of Social Meeting ..	..	£16	0	5
" Subscriptions ..	..	101	10	0	" Printing Annual Proceedings ..	..	40	2	0
" Entrance Fees ..	..	3	15	0	" Stationery, Printing, &c. ..	..	15	6	1
" Tickets for Social Meeting ..	..	11	13	0	" Rent of Museum ..	..	11	6	0
" Sale of Flora ..	..	0	4	6	" Geological Section ..	..	1	0	0
" Profit on Excursions ..	..	3	3	0	" Commission to Collector ..	..	6	5	6
" Balance due Treasurer ..	..	11	5	10	" Prizes Awarded ..	..	1	0	0
					" Donation— <i>Irish Naturalist</i> ..	..	2	0	0
					" Donation—Irish Field Club Union ..	..	2	2	0
					" General Expenses—				
					Postages ..	£25	9	2	
					Insurance ..	1	4	6	
					Incidentals ..	3	13	9	
					Gas ..	2	19	11	
					" Expenses—Lectures ..	..	33	7	4
							3	7	2
							£131	16	6

W. H. PHILLIPS, Treasurer.

PROCEEDINGS.

SUMMER PROGRAMME.

EXCURSIONS.

23 May.

ARMOY AND BALLYCASTLE.

A smaller party than is usual on the occasion of the opening excursion of the season visited Armoyn and Ballycastle. This was probably occasioned by the rain of the morning, but the fears of the timid were not realised, as lovely weather was enjoyed throughout the whole day. The party left the train at Armoyn and at once made for the church, where the remains of the fine old round tower still stand in the graveyard. This was carefully examined and photographed by some of the members, whilst the quaint old tombstones in the graveyard were inspected with interest. The Rev. J. P. R. Breakey, A.M., rector of the parish, here met the party, and pointed out the interesting features of the district, including a souterrain adjoining the glebe. Leaving the church, a short halt was made at the chapel to see a couple of rude crosses in the yard. Passing on down the narrow country lane, sweet with the fragrance of great overhanging bushes of hawthorn, to the left rose the great dome of Knocklayd, with the cloud shadows flitting across its sloping sides, a partial ascent of which was made to visit the very ancient rude crosses of Tullahora on the summit of a small mound. A weatherworn incised marking on the side of one puzzled those present with its meaning, different interpretations

being put upon its meaning. From this point the great valley of Glenshesk opened out in greater beauty and fertility, affording charming views of river, wood, and mountain. The district is full of botanical interest, especially as regards the cryptogamic flora, but the great find of the day was the rare whitlow grass, *Draba muralis*. This is rare as a British plant, and as regards Ireland still more rare. It is stated that one plant was found long since growing on the walls of Blarney Castle in the South, and Dr. Dickie said it was naturalised on old walls near Belfast, but it does not seem to have been seen by any living botanist in either station. On the walls of an old bridge near Armoy, however, it is plentiful and luxuriant. *Draba muralis* has also been found on the walls of Glasnevin, where it was supposed to have escaped from the Botanic Garden. The occurrences in Ireland of this plant have all been attributed to accidental escapes from gardens, but, if not indigenous, it is more probable that they are still lingering relics of a more extensive cultivation at a remote period. The ruin of the old church locally known as Goban Saer's was visited, perched on an overhanging ridge, its strong masonry afforded evidence of its early building, and giving grounds for the popular belief that its erection was due to the great mythical builder Goban Saer. The ruined fort of Dun Rainey, about which the Rev. George Hill has written so descriptively, having been passed, and the Margie crossed, a halt was made at the ruins of the old Franciscan Abbey of Bun-na-margie, the sleeping place of the MacDonnell's of Antrim, and many of their followers in the Glens. Whole chapters might be written of the historical events that happened in this district in the past centuries, events of greater historical interest and of more romantic character than those perhaps of any other portion of Ireland. In the old abbey the Rev. A. S. Woodward, A.M., read a short paper descriptive of the ruins and their history. At five o'clock all assembled in the Antrim Arms, Ballycastle, where tea was provided.

6 June.

CARRICKFERGUS SALT MINES.

On this date the Club held their second summer excursion, and a fine afternoon brought the large number of over 100 members together in time to catch the 2.15 train to Carrickfergus, from which station the whole party proceeded to the salt mines at Duncrue, some two miles distant. Here they were met by the representative of the owners, who placed his services at the Club's disposal during the afternoon. The tedious business of lowering the large party into the mine was then begun by the two shafts, down each of which the buckets carried four persons at a time, one of the buckets being raised at the same time that the other was lowered and by the same engine. The depth of the shaft is about 750 feet, so that the mines are considerably below the sea level. On arriving at the bottom each member was supplied with a candle, and parties were formed, each under the guidance of one of the miners and one of the geological members, to explore the galleries. A number of Bengal and coloured lights were lighted, which gave good effect among the piers that had been left to support the roof—often forty or fifty feet above the floors—while the crowd of little twinkling lights seen at the far end of one of the numerous drives was very wierd. So numerous was the party that the first section was up again before the last was down. At appropriate times William Gray and Alec G. Wilson (Hon. Secretary) briefly described the geological features of the Triassic period and the salt beds in particular.

The salt is here worked by being quarried from the thick bed, often almost in a pure state, and when raised to the surface in buckets is tipped into a reservoir, from which the brine flows down to the evaporating pans near the town. The best thanks of the Club are due to Alexander Miscampbell, the Irish manager of the Salt Union, for his courtesy in allowing the members

to visit the mine. On reaching the surface the members walked to Carrickfergus, some of them loitering in the neighbouring fields, the result of which was the discovery of the "water soldier" (*Stratistes aloides*), and the woodvetch (*Vicia sylvatica*). The former plant was a most interesting find, as in Stewart and Corry's flora it is marked as "now extinct" in the three recorded localities, and this is a new station for it, and therefore the only known one in Ulster. The vetch is also rare, but the station has been previously recorded. Those who were not able to go by the earlier train left Carrickfergus by the 8.5 train, thus giving them all time to visit the old Church of S. Nicholas, where W. J. Fennell read a short paper on the architectural features of the building, which was illustrated by a most excellent series of photos and drawings. His paper was such an admirable exposition of the building as it once stood and now remains that it is here appended *in extenso*.

W. J. FENNELL said—This ancient Church of S. Nicholas is a marvellous example of how successive changes and restorations can thoroughly transform a once stately building into a structure almost completely shorn of all that once gave it freedom and proportion. The present plan of the church is that of a rudely-formed and inverted Latin cross—that is, with the long stem of the cross serving for the chancel plan instead of the shorter one. Those who were with us last summer in Galway and visited the stately old Church of S. Nicholas there, and noted the fine series of columns and arches opening it up into a triple nave, may be surprised to learn that this church in many respects as regards its plan was a sister church, enjoying the same light, airy treatment of triple nave, with round and clustered columns and pointed arches so dear to the early Gothic builders, and the same wide transepts sheltering the minor or side chapels; and it may still more surprise some to learn, as they regard these dark heavy-looking nave and transept walls, that many of these columns and arches still remain there though concealed from view. Of the original "foundation" of this church little is known. Of course the story of being founded on the site of

a pagan temple comes in here, as in most cases of the kind. I have no doubt but that a church of some kind existed here in the early history of the Irish Church, but we have to come down to the thirteenth century before we find any trustworthy evidence. The Franciscan Priory of Carrickfergus, which became an institution of much importance, and which stood where the old gaol now is, was founded in 1232 by Hugh De Lacy, and Lewis, writing in 1837, says :—"The subterraneous passage under the altar which communicated with the ancient monastery may still be traced." I am not aware if any portion of this passage still exists, and I would be very much surprised if it ever did exist, as it is really a mistake to suppose that subterranean passages, dungeons, and secret chambers were always connected with such places. De Lacy, the founder, was buried in the priory in 1243. "*Apud Cnockfergus in Conventu Fratrum.*" The monastery existed until the Dissolution, and when the monks had to go they devoutly prayed "that it might become the habitation of thieves." It soon became the county gaol. There is no doubt that the Franciscans largely used this church if they did not actually build it. The date 1232 is important. In 1872 Thomas Drew, a most accomplished architect and archæologist, effected some slight improvements here, and at the request of the late Bishop Knox he fully investigated every inch of this church, and his report is most interesting reading to those of antiquarian tastes. During his investigations a valuable side light was thrown on the foundation of the present building by Edmund Sharpe, an English archæologist of great fame, who said, "Some architectural details of Carrickfergus have not in his wide experience an exact parallel save in Byland Abbey, in Yorkshire, built by De Lacy, invader of Ireland," and we know that it was about 1230 that De Lacy was paying some kind attentions to Carrickfergus. No doubt he brought his builders, who were most possibly Franciscans, in his train, who very naturally reproduced their own peculiar details here, and it was a happy thought of these builders to dedicate the church of a great important

seaport under the invocation of the patron saint of fishermen, sailors, and travellers—Saint Nicholas. When Thomas Drew was called in, it must have occurred to him, as it would to any architect, why in an extensive foundation like this were the usual traditions or forms of St. Nicholas's Church planning departed from? Why were not the examples of Great Yarmouth, Newcastle, Waterford, Galway, and the Continent followed, with above all the triple nave so characteristic of this saint's churches, or at least a cause for adopting the rude form of Latin cross? He soon found the evidences of the thirteenth century buildings that led him to work out the plan as it then existed, and which I have taken the liberty of copying from his work in order to place before you. One of these plans shows the church as it now stands, indicating the different stages of its changes. In the angle of the transept and chancel he found the fragments of the clustered column, which gave him a starting-point to work from, and in the walls of the present nave he discovered some of the old columns *in situ*, marking clearly the great lines of the arcading. Thomas Drew thus describes the church as it stood in 1230—"It may be presumed that at the original foundation, the west end of which no trace has been found, was on the site or slightly westward of the present tower: that in its earliest form it consisted of a nave 75 feet long and, a strange peculiarity, 25 feet wide at the west end, while it was but 22 feet wide at the east end. The nave had on each side five pointed arches, springing from circular columns opening into side aisles, and, opposite, the two eastward arches on each side would appear to have been lateral chapels, two on the south and two on the north, which occupied nearly the area of the present transept. These chapels were most probably dedicated under the invocation of the Blessed Virgin, St. Patrick, as the national saint. St. Nicholas the patron, and St. Francis of Assisi, the founder of the Franciscan Order; but this of course is purely conjectural, or they may have been endowed as chantries. The high altar was set to the eastward of this nave in a chancel, the dimensions of which we have no

evidence." It will be noticed from this plan the great extent and importance of the south transept, and on the exterior face of the present west wall can be seen the voussoirs of the arches which are buried in it. This completed the thirteenth century church, and, coming to 1303, we find the present chancel added to the church by one Robert de Mercer, no doubt one of the wealthy merchants of the town, whose piety prompted the undertaking. All this work bears the mark of the advancement that a century had made in passing from the severe early English to the more "gentle" lines of the decorated period. It occurs to me that it was never the intention to extend this proportion eastward as a chancel—as it is absurd and meaningless to set the high altar back so far and out of all harmony with the accepted system of church ritual—but that it was added as a Lady chapel behind the high altar, of which there still exist numbers of fine examples. The importance and wealth of the church at this time may be gathered from the fact that in the famous Papal taxation of 1306, which the late Bishop Reeves has given us, it is rated at an amount exceeding by far any church in Down, Connor, and Dromore—viz., 20 marks per annum, the tithe whereof was £7 7s 2½d, a large sum when represented by the currency of the present day. Coming to the next century, 1400, the church had undergone some alterations and changes; large Tudor windows of poor design were inserted, which were removed in 1872, and work of a more suitable character inserted. Passing over the troubled times of the Dissolution, and the changes wrought by stormy political movements, and Puritanical attempts to wipe out all evidence of a former ritual, during which time the church fell almost into ruins and got patched up almost anyhow, we come down to 1614, when we find the Chichester family in possession and a system of jerrybuilding going on which was no doubt considered very beautiful in those days. You can see the stone bearing the inscription, "This work was begun A. 1614—Mr. Cooper then maior—and wrought by Thomas Paps, Freemason, Mr. Openshaw being parson. *Vivat Rex Jacobus.*" Paps built up

and hid everything he could, I have no doubt with the very best intentions. He also erected a porch on the south side, which ceased to be used when the tower was built, and then became the "Wilson" tomb, and remains as such. Paps made no attempt to restore what he did not understand, but he preserved what did remain, and it is owing to his work we are enabled to trace the thirteenth century work. The Chichesters "restored" the north transept out of all recognition, and converted it to their own uses, making a vault under it, which accounts for the higher level of its floors at present. They also erected the great monument to the founder of their house in this country, which is an example of Jacobean work, then much in favour with great wealthy families, and bears in its details a great resemblance to many in England, of which I have some photographs for your inspection, notably those of the Manners from Bakewell Church, one of which shows the famous Dorothy Vernon. The monuments are very valuable as records of the architectural style and the costumes of the period. You might notice the old Jacobin joinery in front of the north transept, which probably enclosed the Chichester pew. You must pardon me for rushing over the remaining dates. In 1754 the chancel roof fell in. In 1778 the present tower and spire were erected. In 1787 the vestry was added. In 1812 the western roof fell in. "In 1830 the north transept was opened again to the church by Lord Donegall, when it was fitted as free seats for the poor." With all this array of alterations, and after all the stormy times, troubles, and changes it came through, "it is," as Thomas Drew says, "little short of marvellous that so much of the ancient church remains as enables its ancient plan to be traced." I think you will agree with me that Thomas Drew's work has revived the interest we must feel in the history of a church that has suffered so much, but which still preserves to us many of its original features, and will always be associated in the minds of Ulstermen with the most stirring and interesting epochs in our past history.

20 June.

GLENARM.

On this day a small party, many being deterred by the threatening weather, journeyed to Larne, where a machine was in waiting to drive the party by Cairncastle and the old road to Glenarm. The summit of the hills having been attained, some time was spent in a ruined souterrain and in the great hollows formed on the high ridges, whose purpose can only be guessed at. A pleasant drive brought the party to Glenarm by the road skirting the deer park. After a short time allowed in Glenarm, when the church was visited, the party drove into Larne where tea was provided in the King's Arms.

4 July.

DREDGING CRUISE.

The Club held a Dredging Cruise in Belfast Lough and adjacent bays where there had not been a dredging trip for some time. Unfortunately for the enjoyment of the party, the morning proved very wet and drizzling but in no way deterred a party of nearly fifty from assembling on board the Steam Tug "Storm Light" before ten o'clock ; at which time the whistle blew for the last time, and the vessel started for the day's work. The guiding genii of the day held a conference almost immediately, to settle the plans of action, following which the boat was headed for Carrickfergus ; on arrival at the desired locality, all the appliances having been previously made ready, the vessel was slowed down, and the first dredge lowered over the side. Ten minutes or so was allowed for the filling of the net, and on the signal being given, a number of willing helpers lent a hand and soon had the first haul on board, a cast of the lead showing $3\frac{1}{2}$ fathoms. The take proved to contain a large quantity of

corallines of various species, with much other material, all of which was emptied out into large flat trays and distributed about the after end of the vessel, for purposes of examination. Hitherto the weather had been getting steadily worse, until at this point the collecting of specimens was eagerly being carried on amid a downpour of rain. Meanwhile the "Storm Light" proceeded at full speed to the second station, three quarters of a mile from Whitehead, where a scrape in $9\frac{3}{4}$ fathoms brought up a most miscellaneous haul, which kept the collectors of ascidians, crustaceans, seaweeds, worms, &c., occupied until the vessel was well under the great cliffs of the Gobbins. Here, sailing close under the precipitous face, the steam whistle's blast raised from their ledges a cloud of sea-gulls, whose screaming cries and wheeling flight distracted the scientists' attention from the spoils of the deep, in order to gaze at the beautiful picture, with the blue sky, now fast clearing of clouds, as a background.

No time was lost, however, but another haul was made in fourteen fathoms, at about a quarter of a mile from the cliffs, bringing up a great mass of small pebbles, among which, however, two *Terebratulæ* were found, to the delight of many (or indeed most) of the party, who had never previously seen a living one. The hopes of getting more rarities in the deeper waters of this locality induced the party to try a fisherman's mussel-dredge of large mesh, in twenty-five fathoms, close by the last station. This appliance brought up very little in bulk, but among its contents was a very large and perfect sponge, measuring nearly four inches across; there were also two sea-urchins in splendid condition, whose movements in one of the large belljars on deck provided much interest to many of the members. Several crabs of different quaint-looking species (*Hyas*, *Portunus*) also disported themselves in an adjoining jar to the detriment of a fine worm, which rapidly disappeared, and to the amusement of the watchers. Meanwhile, the gallant little tug was making all possible speed outwards towards the "Maidens," but owing to the roughness of the water where

unprotected by the land, the project of taking a netful from the deep water of mid-channel had to be abandoned for fear of losing the tackle ; fate however was adverse, and on trying to make a haul off Larne, one of the dredges was carried away altogether, and the other, a brand new one of novel make, came up with its frame bent, and quite empty. This so disgusted members, that full speed was at once made for Whitehead, under whose sheltering cliffs tea was quickly prepared and most thoroughly enjoyed. Over fifty species of shells were found in all the dredged material, including

Terebratula caput-serpentis.

Cardium minimum.

Crenella decussata.

Odostomia rufa var. *fulvocincta.*

Trochus montagui.

Venus casina.

Pecten Testæ.

The tea-things having been cleared away, it was suggested that the next trial should be made off the centre of the mouth of the lough ; which proposal being acted on, resulted in another empty net. The increasingly rough water, on the southern side of the lough, made it advisable not to risk the remaining dredges, so orders were given to return in Kilroot direction, where a haul resulted in an enormous number of dead *Venus* shells being brought up.

After this no time was lost in making for Belfast again. On nearing the jetty at Queen's Bridge, Alec. G. Wilson (Hon. Sec.) proposed briefly that a hearty vote of thanks be given to J. Waterson, the owner of the "Storm Light," for his invaluable assistance in making the trip the success it proved to be. This was passed without further ceremony by a hearty round of applause. Three new members were then elected. During the trip, the Club was pleased to entertain four members of the Dublin Club, who availed themselves of the invitation to the other Club, and whose services during the day proved of great value, Prof. Johnson and Dr. C. H. Hurst being specialists in

their respective lines of marine botany and zoology. Prof. Johnson's notes on the Algæ collected and Dr. Hurst's list of the animals observed were published in the October number of the *Irish Naturalist*.

10, 11, and 12 July.

FIELD CLUB UNION CONFERENCE.

CAVAN AND LOUGH OUGHTER.

The Club's Annual long excursion took place to Cavan and Lough Oughter. The Belfast party, numbering about twenty, left by the Great Northern Railway at 8.10, arriving at Cavan about midday, proceeding at once to the Farnham Arms. Shortly after the arrival of the Northern naturalists the Dublin party came in, both clubs having arranged their long excursion to the same place under the Irish Field Club Union. Early dinner over, brakes were taken to Lord Farnham's deer-stocked demesne, where a pleasant little treat was ready in the shape of a visit to the private museum of the castle. This collection contains a most remarkable series of amber, a fine series of quartzes and silica in its various forms, and an exceedingly handsome and valuable set of polished pebbles, agates, jaspers, and many other semi-precious stones. Many were the exclamations of admiration as stones, each more handsome than the last, were noticed. The fossil collection was also large, but could not be so well seen, and Lord Farnham's fine collection of fossil fishes is now public property.

Leaving this room after a time all too short to admit of a proper appreciation, the brakes were again mounted, stopping at Derrygid Wood, after a long drive through a well-timbered estate. Here the party dismounted, and at once proceeded to work. Within a few minutes several members had found a large and handsome species of a rare land snail (*Clausilia laminata*), an addition to the local list though recorded from the county previously, but not from any other Irish locality.

Beetles, butterflies, and moths, snails, spiders, and other interesting forms of life were systematically collected by the members ; but, as most of the rarer species have yet to be more carefully examined, the full list of captures are not here available. Those who would care to know more of the smaller animals are referred to the August number of the *Irish Naturalist*. After a most enjoyable afternoon's outing, the party gradually proceeded homewards in time for supper at nine.

Saturday began by breakfast at eight, immediately after which the brakes were again taken, past Lord Farnham's to the first halting-place at Kilmore Cathedral, the place of greatest interest to those of antiquarian tastes. Kilmore has a beauty and a history all its own, and is especially associated with "the most faultless character in all ecclesiastical history"—William Bedell, who was bishop there during the wars of 1641. The present stately building was erected in 1860—"In memoriam Gulielmi, quondam Kilmorensis Episcopi," as the great western doorway records. All remains of the old cathedral have passed away, but the subsequent church is still used as a schoolhouse. In the adjoining demesne Bishop Bedell was permitted to remain during the early part of the crisis, and here he collected around him all the distressed and homeless English, with many of the Irish, administering to one and all the food and clothing that had been left to him. The Irish said he should be the last of the Saxons to leave the country because he was the best of them, but he was not suffered to reside in his own home, but was removed a prisoner, with others of his household, to the neighbouring castle in Lough Oughter. Here he suffered many hardships, for "In this pit there was neither door nor window of glass or wood to keep out snow or rain, and the boards of the floors so rotten and broken with rain that it seemed not safe to walk upon them." Here the learned and worthy Bedell—he was the first who translated the Bible into Irish—contracted a cold that ended in his death after he had been exchanged as a prisoner and removed to the residence of one of his clergy, the Rev.

Denis O'Sheridan, near Kilmore. No more remarkable sight was ever seen at an Irish funeral than what occurred around the grave of Bishop Bedell. The friends of the deceased prelate surrounded the coffin, but a ring of armed Irish, with their leaders, surrounded them, drawn by the magnetism of a good life to be present at the death ceremonies. The Irish fired a volley, and said with a loud voice, "*Requiescat in pace ultimus Anglorum*," whilst a priest who was near exclaimed, "I would to God that my soul were with Bedell's!" The Bishop's grave was carefully examined and a drawing of the arms made, the inscription not being decipherable, the word "episcopi" only being faintly seen. Photographs were taken, including one of the great sycamore tree overshadowing the tomb, and said to have been planted by Bedell himself. The inscription on the tomb could be read in 1820, and with the exception of the word "depositum" it has been repeated on the present Cathedral. One or two members got into the tower of the Cathedral, where a numerous colony of the little long-eared bat was found, several of which were captured, some to be released, others to increase collections. Curiously enough, no record of the Cavan bats has been made, so they were of considerable interest, the trip resulting in three species being taken, one being the rare "hairy-armed" bat. Good land-shell material was also collected for future investigation. The next halt was made at a little quarry in a field alongside the road, where a series of rocks was found, the carboniferous sandstones being intruded into by eurite and basic dykes, specimens being taken. The granite at Crossdoney was next examined, and samples of it also carried away, some showing the junction with the Ordovician rock. Thence another drive brought the party to Killykeen, on Lough Oughter, where lunch was served on the shores of a most romantic lake, almost equal in beauty to portions of Killarney. Boats were kindly placed at the Club's disposal by several local gentlemen, by means of which the islands and the opposite side of the lake were explored. Trinity Abbey was visited, from which the early

door, with Celtic ornament, was removed to Kilmore Cathedral; also the great circular keep, Bedell's Tower, on the crannoge in Lough Oughter, the battered walls of which told of many a hard-fought encounter. Washed up by the flood was a quantity of excellent freshwater shell material, yielding most of the local univalves, and the entomologists were delighted to find the larvæ of a rare moth on the aspens. On the return journey a visit was paid to the bog at Derrywinny, where the great sundew, the frogbit, two species of bladderwort, ivy-leaved duckweed, and other rare plants were taken. The rare sedge (*Carex*, the pseudo *Scirpus*) was in quantity, and the tall bulrushes were observed in full flower. The return journey was ended in time for dinner at 8.30, after which tables were cleared, and an exhibition of the finds of the day was held. Professor Cole gave a brief but most interesting account of the geological features, and R. Ll. Praeger described the carnivorous apparatus of the bladderworts. The Club's prize 21 was awarded to Henry Hanna, B.A. Sunday was an open day, when members could do as they pleased, many staying in Cavan for church, others driving to Killykeen, arriving back for dinner at eight. The last day of the trip, Monday, was commenced, after breakfast, by a drive along a somewhat hilly road to the base of Slieve Glah, a mountain of Ordovician sandstones and slates, from the top of which a most extensive view was obtained, the hills of Tyrone to the west, Tara and the hills of Dublin to the south. On the summit a short geological and geographical account of the district was given by Professor Cole and Mann Harbison. The descent was made to the east to see a fine rath at the base, where the party were entertained by the veracious stories of banshees, witches, and fairies told in perfect belief by a cottager, who, in addition, produced a quantity of milk for refreshment of the members, and obtained for two of the members a quaint form of primitive lamp, which was of some interest. Near at hand was a small lake, from the boggy shores of which had been unearthed a dug-out canoe some two years previously, of which, however, no trace remained. Several

beetles and plants were here obtained, though none were of much rarity. After a hearty lunch on the sward and a pleasant mingling with an interesting peasantry, cars were again mounted, and the drive made into Cavan in time to collect luggage, have some tea, and catch the train home, Belfast being reached at half-past eight. The excursion, though not to so novel a district as that of last year to Galway, was nevertheless a most enjoyable one, partly due to the good fortune in there being only one heavy shower during the whole stay, and that on Sunday morning, and partly owing to the beauty of the country and the general lack of acquaintance with its various picturesque features in wood and lake. The mingling of North and South was again appreciated by all present, and added much to the social pleasures of the excursion. The members were much indebted to friends in Cavan for their attention during the Club's visit to their district.

15 August.

SLIEVE GALLION.

The party to Slieve Gallion, numbering over twenty, leaving the Northern Counties Station at eight o'clock, arriving at Moneymore at ten, a through carriage having been provided by the Railway. Cars were at once taken, and the drive will be a pleasant recollection to all the party, the hedgerows being bright with blackberries and honeysuckle. Arriving at Lough Fea, the secretary announced that a boat was on the lake to explore the crannoge showing so conspicuously in the centre, and that permission had been given by Colonel Poe to pass through his woods. He then read a short notice of the geology of the district, written by Professor Cole, who had been working out the local rocks, the main features being the intrusion of granite in pre-carboniferous times into the much older pyroxenic and hornblendic rocks, formerly supposed to have been altered shales and sandstones, but now recognised as being volcanic in

origin, ashes and tuffs having been found in considerable quantity, and vesicular structure being often seen. The melting up of the older rock by the molten granite seems to have produced a curiously mixed rock on a regional scale. This is described in the Geological Survey and elsewhere as Diorite, and was supposed to have been of separate origin. It is also of considerable interest to see the small capping of our familiar basalt and chalk, showing what a gigantic amount of denudation has gone on in geologically recent times in order to clear all the basalt and most of the chalk from the great valleys on either side of the mountain. The members were then free to either ascend the mountain or explore the lake ; but the entire party decided to climb, so a start was at once made, over fields and by cart lanes, until the open heath was reached, investigating each crag and exposure of the rock. The party gradually reached the summit (1,623ft.), from which the view proved somewhat disappointing owing to the heavy clouds covering the sky. After a short rest, the descent was undertaken, passing exposures of the mingled rock above referred to, and reaching the road in time to take the cars again. Another drive brought the members to the top of Carndaisy Glen which pleased everyone by its beauty. The little stream has cut down through gravels and sands until it now has got some way into the rock. The sides of the gorge rise steeply, timbered on either hand, while the carriage road runs down close by the stream. Leaving the vehicles, the members scattered in pursuit of their various avocations, the fungi being (though still early) especially noticeable. The hedgehog mushroom (*Hydnum repandum*) was in considerable quantity, as were several species of *Russula*, *Boletus*, *Amanita*, *Peziza*, and several more, samples of many being taken for future identification. Halfway down the glen the surprising sight was seen of the stream rushing against the steep bank, and, having cut through it, flowing at right angles to its old course, now quite dry. This has been caused by a second stream cutting its way from outside till its bed was lower than the main one, thus when cut far enough back tapping the

larger stream and producing the above strange effect. On arriving at the end of the glen cars were again mounted, and the few miles separating Carndaisy from Moneymore were soon covered, bringing the party quickly to the Drapers' Arms, where tea was in readiness. It should be mentioned that some members of the Gaelic League accompanied the Field Club, and succeeded in finding quite a number of Irish-speaking people, though even the magic key of silver failed to extract Gaelic from the younger members of the community.

29 August.

SLIEVE CROOB.

A representative party journeyed to Ballynahinch, where they were hospitably met by the Rev. Father Quail, who had thoughtfully provided a tea and coffee lunch at the hotel, here the machines were mounted and a start made for Slieve Croob and the source of the Lagan. On the way the party stopped to examine the deep cutting made by the Water Commissioners in connection with the Mourne water supply, whilst others botanised along the fields and some took photos of the quaint harvest operations then in full swing. A short halt was made in Dromara, and a visit paid to the Church which was erected during the episcopate of the celebrated Bishop Percy, and bears his name upon the tower. The machines were left on the hill above Dromara and the climb commenced, halts being made at the different springs on the hillside, for the Lagan has many fountain heads. The next halt was on the cam crowned summit of Slieve Croob, where the party was photographed by Alex. R. Hogg, grouped around the great stones of the cam. The descent was then made by the other side where the machines were waiting. A quick drive and Father Quail's rural little chapel at Dunmore was reached, and a hasty inspection made of his geological specimens and antiquities. The road was then taken past Macaulay's lake to the Spa Hotel, where tea was provided prior to Ballynahinch being reached and the last train taken for Belfast.

WINTER SESSION.

NOTE—The authors of the various Papers, of which abstracts are here appended, are alone responsible for the views expressed in them.

27 October.

SOCIAL MEETING.



THE winter session of the club was inaugurated by a social meeting in the Exhibition Hall. The company was a large one, completely filling the available space in the main hall, and comprising a good representation of the membership of the club, with many friends of both sexes. Tasteful floral decorations at the platform end made the hall very pretty, while rows of coloured fairy lamps in the corridors lent a picturesque effect to the entrance. Tea was served from seven to eight o'clock at tables ranged around the main hall by the lady members of the club. Thanks to the energy of the secretaries and the cordial co-operation of members, there was abundance of intellectual as well as social enjoyment provided. There was an exhibition arranged in the hall, comprising botanical, conchological, geological, and entomological collections; photographs, seals, and microscopic specimens. In the minor hall capital displays of the X rays were given by W. J. Walker to crowded and admiring audiences. Each display showed the wonderful action of very high tension electricity, the current being somewhere about 200,000 volts. This enormous pressure is very difficult to insulate, as was shown by the volume of sparks given across a space of about 2 in. wide by 3 ft. long between two insulated wires, and also by the glow

given out by long Giessler tubes, without contact with the wires. The action of the current in the Crookes vacuum tube was then shown, and afterwards a large number of objects were exhibited, such as the hand, wrist, and elbow, a bag with pincers inside, a book with scissors, and many more, including a sheet of aluminium, which was quite transparent, and a sheet of plate-glass, quite opaque to the rays. In addition to this, W. J. Walker had on view what he humorously described as "X rays by diffraction," which deceived many until they were enlightened. This ingenious, yet simple, trick consists in looking at the outstretched fingers against a bright surface through an ordinary feather. The effect of the diffraction of the light by the feather is to show what looks wonderfully like the bones of the fingers. The side hall was devoted to the lantern, skilfully worked by Lizars & Co., where crowded audiences were delighted with the exhibition of a comprehensive series of slides depicting botanical, geological, and archæological subjects, the photos shown being the work of F. C. Bigger, Professor Cole, W. J. Fennell, W. Gray, A. R. Hogg, Dr. MacWeeney, J. St. J. Phillips, and R. J. Welch. In connection with the photographic section were likewise shown the albums in connection with the club's archæological and geological survey of Ireland, containing about 400 platino-type photographs of Irish subjects, in addition to a number of other photographic albums and some views illustrating the last season's excursions. A collection of photos of wild flowers in their natural habitat by that capable artist, R. J. Welch, was much admired. The exhibits of the botanical section were highly attractive, comprising choice British and exotic ferns, illustrated by fresh-cut fronds and growing plants, supplied by W. H. Phillips (honorary treasurer) and Charles M'Kimm (curator of Botanic Gardens Park); plants collected during the season by R. Lloyd Praeger (honorary secretary of the Dublin Field Club), Professor Edmund J. MacWeeney, of Dublin, exhibited some bacterial cultures and slides, and a select series of Irish fungi, including some that cause disease of the potato plant.

A compact little collection under the departmental title of "Marine Life" comprised a number of books illustrative of marine life, lent by the Free Library, and some models of marine life, lent by the Queen's College. Henry Hanna, A.M., showed a collection of invertebrates and a clever series of slides, for which the club's prize had been awarded, while some seaweeds collected on last season's dredging excursions were exhibited by Professor Johnson and Miss Hensman. Professor A. C. Haddon contributed some examples of commensalism and symbiosis from the marine fauna of Ireland and other countries; and Mrs. J. T. Tatlow had a collection of seaweeds collected at Roundstone, Connamara, and a comprehensive series of shells collected on Magilligan Strand, County Derry. The conchological section comprising the above and the collection of land shells by R. J. Welch was one of the finest ever shown in the club, and one which attracted attention. Near this was the table of A. G. Wilson (honorary secretary) displaying rocks and miscellaneous objects of interest, including specimens of Irish fresh water pearls and the pearl mussel (*Unio margaritifera*), the shipworm, with samples of its destructive power, and some primitive forms of lamps. Dr. C. Herbert Hurst had also a collection of marine life objects. The geological exhibits comprised photographs of features of the high Alps, by the late W. F. Donkin, from the geological department of the Royal College of Science, Dublin (Professor Grenville A. J. Cole, president of the Dublin Field Club); crush conglomerates (with microscopic section) from the Isle of Man, Tertiary dykes from County Down (Miss M. K. Andrews), opal and chalcedony from the rhyolitic area of County Antrim, rhyolites from Kirkinriola and Cloughwater (Robert Bell), fossil wood perforated by insects, from the Gault of Ventnor, Isle of Wight (J. O. Campbell), microscopic sections of rocks and fossils (William Gray), rocks collected on Field Club excursion to County Cavan, rocks of Slieve Gallion, County Derry (Alex. G. Wilson), junction of granite and Ordovician rocks from the new waterworks tunnel (Leo. M. Bell), microscopic section of

riebeckite granophyre from Isle of Skye (J. St. J. Phillips), Lias and Greensand fossils (George Maclean), banded and altered shale from waterworks, Newcastle (Robert Young), fossils from Cretaceous rocks of Kent, Rhaetic fossils from Bath, specimens from lead mines, Foxdale, Isle of Man (Miss S. M. Thompson, honorary secretary of the section). To the microscopic section, which was in the highest degree interesting, the following contributed :—Rev. John Andrew (president of section), Henry Hanna, A. R. Hogg, W. S. M'Kee, Joseph Wright, Lorrain Smith, Cecil Shaw.

In the entomological department J. T. Tatlow showed a collection of butterflies from the Austrian Tyrol. Among the miscellaneous attractions, the great seals of England, exhibited by John Vinycomb, formed a distinctive feature.

At eight o'clock the president, Lavens M. Ewart, took the chair. The president, who was received with applause, said—In the first place I have to offer a welcome on behalf of the club to our visitors, and hope they may have an enjoyable and profitable evening, and I have especially to express our thanks to those who have come to help us in the business of the present meeting. Many of them have come from afar, and we are grateful to all from far and near. I should like to say a few words on a subject of much importance at the present time, that of the Giant's Causeway, and it is surely a subject which concerns the club. As most of those present must be aware, a few speculators have banded themselves together to endeavour to exclude the public from free access to this truly gigantic creation in order to make money out of it for themselves, and they have invoked the Court of Chancery to establish them in this undertaking. Three gentlemen, of whom, unfortunately, I am one, have been served with writs in respect of so-called trespass, and the battle has begun. A committee had already been formed to protect the rights of the public, and they are defending the action. Owing to the fact that the Causeway Syndicate is a public company they cannot be required to give security for costs, and as their capital consists of, I am informed,

but £7, whether we win or lose we—that is to say, the Causeway defence committee—will have to pay our own costs. Our solicitors, Greer and Hamilton, of Ballymoney, estimate that the costs may amount to £400, and this sum at least we must raise. We ask for help in the matter of collecting subscriptions, and collecting lists will be supplied to all who will take them. We earnestly ask all those who value liberty to take lists, and get their friends to take them, so that practical interest may be aroused on all sides in asserting the independence of the public. Large subscriptions, as a rule, are not asked for, but small sums given by the many, for it is a matter which concerns the many. Evidence is also wanted from those who have known of the Causeway as a public resort for forty or fifty years or more. I shall not occupy your time longer, but direct your attention to the different exhibits mentioned in the programme.

The remainder of the evening passed quickly over, the large number of people fully occupying their time in examining the different exhibits and in listening to the numerous gentlemen describing and explaining the objects which crowded the tables occupying the floor of the hall.

17 November, 1897.

At the opening meeting of the winter session Lavens M. Ewart (President), occupied the chair, and there was a crowded attendance.

The PRESIDENT said they were met that night to inaugurate the winter session after a very enjoyable and instructive summer session. The Belfast Naturalists' Field Club was now in its thirty-fifth year of existence. The first year's membership was 102, of whom only about twelve remained to the present as members, the balance having died, left the country, or resigned. However, those who remained continued to take an active interest in the Club, amongst them being W. H. Patterson, W. Gray, the lecturer of that evening, the Treasurer, W. H. Phillips,

and S. A. Stewart. They had a visit during the year from one of the original members, Professor Tate, and he had been delighted to see so many of his old friends, and to hear of the continued prosperity of the Club. At the end of the first decade, in 1874, the membership was 227. In that year the guide had been published for the British Association, and they would agree with him that a new one should be issued. The guide has been very valuable indeed. At the end of the second decade the membership was 280, and towards the end of the third (in 1891) R. Ll. Praeger and F. J. Bigger had been elected hon. secretaries, and the Club had 280 members. Since that time the membership had increased very rapidly, until in 1893 it stood at 400, and in 1895 at 500. It was then felt that the Club was sufficiently large to be easily worked, and a small entrance fee was charged. By the systematic removal of the names of defaulters, the membership now stood at a little below 500, and the Committee considered it wise not to have too cumbrous a society. The last report was now in the members' hands, and it contained the usual reports, and also a valuable bibliography on Irish glacial geology by R. Ll. Praeger. Their joint excursion with the Dublin Club to Cavan in July had been most successful, and strengthened the alliance between the Dublin and Belfast clubs. The proposed long excursion to Ballycastle and the Giant's Causeway next year, with an invitation to the Dublin Club to join them, would further strengthen the relations between the clubs. At the conversazione that union was strongly marked by the presence and help of their Dublin neighbours, and last week several of their members visited Dublin. The sections of the Club were doing very valuable work—the geological under Miss S. M. Thompson, and the botanical under the Rev. C. H. Waddell, whose popular leadership was very beneficial. He would ask those who took an interest in natural science to support the official organ of the Club, the *Irish Naturalist*, edited by R. Ll. Praeger; and those interested in antiquarian matters should subscribe for the *Ulster Journal of Archaeology*, edited by F. J. Bigger. It

required a larger subscription list to carry it on, and there was no better value to be had. The same remarks applied to the *Irish Naturalist*, as it needed subscribers to meet the expenses—in fact, it had to be subsidised by private friends. Such a valuable paper should not have to rely upon that source of income. The Club gave every encouragement to special work, and aimed at making all the lectures as popular as possible and open to the public, knowing that those who took an interest in such matters would join the ranks of the Club and assist towards its prosperity. He would call upon Mr. Gray to proceed with his lecture, which would be a great treat, especially at the present time when the Giant's Causeway was perhaps under a cloud—he hoped only for the moment.

Mr. GRAY commenced his lecture, "The Origin and Present Condition of the Giant's Causeway," by stating that the Giant's Causeway was no new subject for the investigation of inquisitive naturalists. It had been discussed by the leading British and foreign scientists since the founding of their oldest scientific societies. But long before they had devoted themselves to the investigation of the peculiarities of the Causeway it had arrested the attention and inspired the wonder and awe of the primitive inhabitants of Ireland—a fact which was verified by the name which had a world-wide reputation—the Giant's Causeway. Primitive man was of necessity an inquisitive naturalist. His very existence depended upon his knowledge of the fauna and flora that surrounded him, and his life's history was influenced by the varied natural phenomena with which he came in contact. He was quick-witted, a keen observer, and attracted by everything that was strange and abnormal in nature. No doubt at a very remote period he was attracted to our shores by the strangely-contrasting masses of black and white rocks that were so conspicuous in the cliffs, the prominent headlands, and caveworn shores of our North coast, and that to-day were acknowledged as forming a geological combination unlike anything else in Great Britain and Ireland. Their evidence of man's early occupation of Antrim was numerous and instructive.

The sand dunes of Ballintoy, Portrush, and Portstewart had furnished them with the most ancient forms of primitive man's stone and flint implements and weapons. His habits, customs, and almost his daily occupation were fully illustrated by the varied and abundant antiquarian remains found in those settlements, while the numerous stone monuments, circles, cromlechs, and cairns that crest the hill tops and line the mountain sides attested his long continued occupation. Primitive man was, as he had said, an inquisitive and experienced naturalist, who properly recognised every phenomena as the result of some controlling cause, and what he was unable to explain on natural grounds was attributed to supernatural agencies. Being an inquisitive naturalist, they could well imagine with what wonder he first traversed the strange pavement of the Causeway, so artificial looking and yet so far beyond the power of human skill, and they could readily understand his natural conclusion that it was a "giant's" causeway, for in this and similar difficulties the active agency of giants was to primitive man as the active agency of "the unknown God" was to the Romans in their difficulty. He called it the Giant's Causeway because of its shape and structure. These causeways were formed of piles driven perpendicularly into the mud of the lake bottom, and the circular ends of the numerous piles formed the passage to the crannoge—a mode of structure that had its parallel in the Giant's Causeway, which is formed of vertical pillars, packed so close together that their ends form a complete pavement or causeway, the difference between the natural and the artificial being that whereas the latter was formed of circular timber piles the natural was formed of solid stone prisms in close contact. The origin of this peculiar form and regularity could not be properly discussed unless in relation to the great sheet of igneous rocks specially characteristic of the North of Ireland. In dealing with that they must remember that all rocks were divided into two very distinct and well-marked groups—namely, the stratified and the igneous. The stratified included all the fossiliferous and

mechanically formed rocks, produced chiefly by the agency of water, and the igneous included all the plutonic and volcanic rock produced by the agency of heat. Assuming that the primary plutonic rock was granite, all the stratified rocks were formed in layers over the granite, and the other plutonic and volcanic works were formed below the granite. All igneous rocks were once in a molten condition and liable to be forced up through the stratified works. The granite zone gradually cooled until it finally ceased as a volcanic rock, and then the inner zone of basaltic rocks was projected into the stratified rocks by the internal volcanic forces. The two zones of igneous rocks gradually passed from one into the other as the thickness of the cooling matter was increased from the surface to the interior, so that this division into zones was quite arbitrary. The division line between the two was determined by the proportion of silica contained in the rock. Mr. Gray, by diagrams, sections, and photographic slides, proceeded to explain how the basaltic rocks were built up to their present thickness through fissures or vents from below, which were now known as dykes, of which the North of Ireland contained numerous and very instructive examples. The result of the continued operation of the forces which he enumerated in geological and modern times was very well exhibited at the Giant's Causeway. The extent, variety, and apparent stratification of the basalt was very well shown on the exposed face of Pleaskin, and was best seen from the spot known as Hamilton's seat, a little to the east of Pleaskin and forming the eastern terminus of the Causeway range of cliffs. That was the spot from which the Rev. William Hamilton viewed and studied the Causeway cliffs, and here he had collected the information in his "Letters on the County Antrim." Having pointed out the great variety of apparent stratified deposits occurring in the face of the Pleaskin cliff, explaining that they were of volcanic origin and of similar elements, that the bedding indicated successive outbursts of volcanic matter, and the lithological differences of the various beds were due to the

condition under which each was produced, the lecturer went on to say that the nature of this columnar basalt had been discussed by the learned for ages, and in explanation of the phenomena various theories had been suggested, such as crystallisation, cleavage, shrinkage, and an accumulation of globular concretions. The late Dr. James Thompson had propounded a theory assuming that the cooling and shrinking mass of basalt cracked into columns as starch cracked in drying, and that the cross fractures and joints were caused by the strain set up in the axis of the columns owing to the expansion of the outer surface of the column. It was more probable that the strain in the centre was caused by the further contraction of the centre portion of the column after the outside portion became rigid. It was clear, however, that the fracture commenced in the centre of the column and extended to the outside, the difference in the sections of the columns varying from three to nine sides. It was not incompatible with the theory of crystallisation, but the marked difference of the angles of the existing columns was directly against the theory of crystallisation. Speculations as to the deposit of the columns might be set at rest, for they were shown their full strength elsewhere on the cliffs, from which they differed only in their more regular form. The various points of interest in the vicinity of the Causeway were then profusely illustrated by a series of views. As to the methods for reaching the Causeway from the headlands above it, they had, he said, several references in the published descriptions from the seventeenth century to the present time. In the "Philosophical Transactions" for April, 1693, a letter was published from Sir Richard Burkeley to Dr. Lister, in which he gave a description of the Causeway, and said—"When you come to the precipice there is no going down there it is so perpendicularly steep, but with much labour and some hazard it may be climbed up. By other ways and winding up one comes down to the strand which forms the foot of this precipice, then runs out northward into the main ocean a raised causeway." In 1708, Dr. Molyneux visited the

Causeway, taking with him a guide from Ballymoney. After describing his journey, he said—"You go down to the Causeway by a very narrow path along the side of the hill"—a statement as correctly descriptive of our present mode of getting to the Causeway as it was no doubt 188 years ago. In 1788 one of our first popular guide books was published. It was entitled "The Complete Irish Traveller in the Kingdom of Ireland," in two volumes. In that was given a very excellent description of the Causeway, but it did not refer to the path. Possibly the writer experienced no difficulty in reaching the Causeway by the usual path. Dr. Drummond, who published his excellent descriptive poem on the Causeway in 1811, said nothing about this way down, while the statistical survey of the County of Antrim of 1812 was equally silent about the same path. He also referred to the Guide to the Causeway published in 1834, and to one published in 1838 entitled "Guide through Ireland" which referred to the hotel built at Bushmills for the accommodation of visitors to the Causeway. Lewis's "Topographical Dictionary," published in 1837, said—"The only access to it by land is down a winding path, cut at the expense of the late Earl of Bristol while Bishop of Derry in the western side of a verdant headland called "Ovid's Snout." There were also references to the Causeway in Mrs. Hall's "Guide to the Causeway," written from 1841 to 1843. M'Comb's "Guide to the Causeway," published in 1861, said—"The only landward access to the Causeway approaching it from the Bushmills direction is down a very steep pathway," In conclusion, Mr. Gray said there was historic evidence to show that the Giant's Causeway had been a place of interest to the curious traveller for nearly two hundred years. Although little had been done for the accommodation of visitors until the last few years, fortunately Coleraine or Bushmills had been the headquarters of the visitors, and there the guides met the coaches and picked up the passengers going to the Causeway. Every effort ought now to be made to develop tourist traffic and to induce strangers to share with the inhabitants of the North of

Ireland the enjoyment of their varied natural beauties, and thus tend to realise that "union of hearts" upon which the prosperity, happiness, and enduring peace of the country so much depended.

F. W. Lockwood, R. M. Young, J. M'Leish, S. F. Milligan, and Isaac Ward also referred to portions of the lecture, and expressed the pleasure they had received in being present.

Five new members having been elected,
The proceedings terminated.

15 December, 1896.

THE PRIMEVAL BASIS AND PROGRESSIVE BUILD OF THE INORGANIC WORLD.

By REV. J. ANDREW.

Professor Geikie has a published lecture on "Mountain Architecture:?" and Pattison Muir, in his "Story of the Chemical Elements," just published, continually speaks of the chemical processes as buildings; he says, at p. 62 "I have compared the processes whereby compounds are produced to building operations; the chemical elements being the building stones, and the compounds the finished buildings." And in the Old Book which we all love to ponder we are told that "He who built all things is God." We are not, then, inventing a new phraseology when we speak of the primeval basis and progressive build of the Inorganic world. And it need not be supposed that the inorganic world will present little of interest for our consideration.

We begin, then, with the so-called *Chemical Elements* such as Hydrogen, Oxygen, Mercury, Iron, Gold, &c. &c., everything that is supposed in our present range of demonstrated knowledge to be *creation's simple elements*; which they are from the chemist's standpoint. Our time does not admit of tracing the gradual historic discovery of these elements. Within the last

hundred years, between 20 and 30 of the somewhere about 70 presently known have been discovered. Before the year 1789, when Klaproth discovered *Uranium* and *Zirconium*, 21 at least of those now known were undiscovered. Klaproth discovered in 1789, *Uranium* and *Zirconium*, in 1795 he discovered Titanium; in 1798 Tellurium: and in 1804, Cerium. Vauquelin discovered Glucinum and Chormium; Tennant discovered Osmium and Iridium; and Wollaston discovered Palladium and Rhodium all about the meeting of the centuries. In the 18th century Boron, Chlorine, Iodine, Tellurium Thorium, Cadmium, Lithium, Magnesium, Vanadium, and Bromine were all discovered. Hartwig, in his very interesting and instructive work on "The Subterranean World," says, "of the metals, the knowledge of the Ancients was limited to 7, namely:—*Gold, Silver, Copper, Tin, Iron, Lead, Mercury*; while now we know 56; most of these new metals were unknown before the beginning of the present century, nor can there be a doubt that further researches will make us acquainted with many more metals whose existence is still a secret to mankind." It was as late as 1894 that Lord Raleigh and Professor Ramsay announced the finding of a new gaseous element in the atmosphere; Newth, however, says whether this gas be a *compound* or a *new element* has not yet been discovered.

Some of you will probably be startled when I say that there are presumably 100 *Elements*; according to the last finding and formulation of science it is so. Let me explain how this has come about, although at present there are not more than 70 announced to the world. In 1864, Newlands was the first to point out that if the elements be tabulated in the *order of the increase of their Atomic Weights* the physical and chemical properties belonging to the *first seven* reappear in the *second seven*, *ie.* that the *eighth* corresponds to the *first* in these characters; the *ninth* to the *second*, and so on through the whole 2 octaves; and he applied to this relationship the name of "*The Law of Octaves.*" A more elaborate and systematic representation of *Newlands' Law* was a little later on developed

by *Mendelejeff* (1869), which is now generally known as "*Mendelejeff's Periodic Law*."

Hydrogen being the lightest element in atomic weight of all our known terrestrial elements is adopted as the unit and standard from which the other elements take their relative weight; and the elements *gradually increase in atomic weight* as the *notes of the music scale ascending increase in the number of vibrations per second* by which they are produced. Hydrogen being the lightest, the other elements are counted as *so many Hydrogens* in weight. The *first seven substances* going up in the order of their increasing atomic weights shew certain *physical and chemical* characters, just as the *seven notes* of the musical octave have certain *tonal* characters by which they can at once be detected and named in any musical composition. After Hydrogen which is the unit and standard, *Lithium* is 7 *Hydrogens* in weight; *Beryllium* is 9; *Boron* 11; *Carbon* 12; *Nitrogen* 14; *Oxygen* 16; and *Fluorine* 19. This is the *first octave*. In the second octave we have *Sodium* 23, corresponding to *Lithium*; *Magnesium* 24, corresponding to *Beryllium*; *Aluminium* 27, to *Boron*; *Silicon* 28, to *Carbon*; *Phosphorus* 31, to *Nitrogen*; *Sulphur* 32, to *Oxygen*; and *Chlorine* 35.5 to *Fluorine*. These are the first two octaves of the chemical elements. After these, which are called the typical pair, there comes an interesting and somewhat mysterious pair of octaves with three "*transitional elements*" between them. These transitional elements also occur between the third pair; and the same thing recurs between the fourth and fifth pairs; and it may be that three may be found between the two octaves of the *sixth pair*; or it may turn out that this last pair may be like the first, a typical pair, without the so-called transitional elements. *Thalium* which is 232 Hydrogens in atomic weight, and *Uranium* which is 239.8 are the heaviest substances yet discovered; they belong to the eleventh octave. The whole of the twelfth octave is yet awaiting. But inasmuch as the octaves of the chemical elements are linked together by these *transitional triads* in pairs; and inasmuch as

two of the elements of the *eleventh* octave have been discovered; Mendelejeff confidently anticipates the *twelfth* octave of elements; for which the eleventh has, so to speak, lifted up its voice and cried for its undiscovered mate; while of itself, also, only Thallium and Uranium, the fourth and sixth, have as yet been discovered. When the Periodic Law was first promulgated by Mendelejeff (1869) there were a number of instances in which the system did not harmonise with the then accepted atomic weights of the elements. Mendelejeff boldly asserted that the atomic weights, and not the Periodic System, were at fault; and in every such case the careful reinvestigation of the atomic weights by numerous chemists has proved the correctness of his assertion. In the case of *Indium* *e.g.* it had been counted 76 Hydrogens. It did not suit that place in the system, and when corrected later on it was found to be 113 Hydrogens, and found its place in the sixth octave, as the third of that octave. Again *Beryllium*, at first called *Glucinum*, was counted 13.8 Hydrogens, but there was no place for it between Carbon 12 and Nitrogen 14, in the first octave. According to its properties it was needed between Lithium 7 and Boron 11. When corrected its atomic weight was found to be 9 Hydrogens, and so its place was between Lithium and Boron. These were excellent confirmations of the Periodic Law as an ordinance of Nature.

And not only has the Periodic Law been of service in bringing about the correction of numbers of doubtful atomic weights; but by means of it Mendelejeff predicted the existence of undiscovered elements, and even described their properties. There were *gaps* in the third and fourth octaves *awaiting elements*. In 1875 *Gallium* was discovered, and exactly fitted the place with atomic weight 70 after Zinc 65 in the fourth octave. And in 1886 *Germanium* was found, with atomic weight 72, which was needed between Gallium 70 and Arsenic 75, with the very properties for the place. And *Scandium* 44 which was needed as *third* in the third octave between *Calcium* 40 and *Titanium* 48, was discovered in 1879, with weight and

character exactly called for in that place in the great evolution of the Chemical Elements.

Thus, then, seven elements in each of the twelve octaves, and three transitional elements linking the octaves in pairs, after the first so-called "typical pair," that is between the five pairs which follow it, make 99 elements, to which when we add the *Hydrogen* which is the unit and standard of atomic weight, we have *Mendelejeff's 100 elements*. So we are encouraged by this *most profound view of elemental classification* to anticipate quite a number of elements which have as yet been withheld from our ken; and most of them must be of great atomic weight.

Allow me at this point to develop a little way this beautiful analogy between the musical and the chemical elements. The first thing is to observe that in the chemical elements the great Builder has set *Hydrogen* as the unit by which the relative atomic weights of the other elements might be measured. *Hydrogen* is the *one*. Now there is no known element whose atomic weight is 2 Hydrogens; nor 3; nor 4; nor 5; nor 6; we spring from *Hydrogen* 1 to *Lithium* 7; then the octave goes on with *Beryllium* 9, Boron, 11, Carbon 12, Nitrogen 14, Oxygen 16, and Fluorine 19. We have, as it were, an octave space between H. 1 and Li. 7 with no element in it. Now it is very remarkable that in *the genesis of the musical elements* the same thing occurs. The starting point of the genesis is the root of under chord, for every scale has an *under*, a *centre*, and an *upper* chord. Now *F* is the root of the under or subdominant chord of the scale of *C* major. The genesis of the scale is a geometric operation; we multiply the vibrations which produce *F* by the primes 2, 3, and 5, this produces the octave the fifth, and third of the under chord *F A C F*; the centre chord is produced by multiplying *C* by the same primes, and we produce *C E G C*; and multiplying *G* the fifth of *C*, as we multiplied *C* the fifth of *F*, by the same primes, 2, 3, and 5, we produce *G B D G*, and then we have the elements of the musical system. Now the thing we are called at this stage to observe

is that from $F1$ to $F2$ its octave there is no element produced, the rest come later on and higher up, by other primes, producing other ratios. It has long been the blunder of musical scientists that they have tried to generate the musical elements from the root of the *Tonic chord*, the *key-note*. The true way is to generate from the root of the under chord, and only use the geometric primes 2, 3, and 5, and the first thing produced is a leap of an octave. The ratio of the octave is invariably 2 : 1. Here then we have an initial point of analogy. The analogy begins at the very beginning of the thing. We can see it by this simple illustration :—

Hydrogen 1	.	.	.	Lithium 7, Beryllium 9, &c.
$F1$	.	.	.	$F2, G, A, B, C, D, \&c.$

But the analogy does not rest in one point of resemblance. We come to what struck Newlands, and which led him to formulate the "*Law of Octaves*." He observed that the *first seven elements* presented a *series of properties*; and then that the eighth element went back and presented not a new eighth feature, but a kind of repetition of the properties of the first; so he tabulated them, like the musical elements, in Octaves, thus :—

{	Li. 7, Be. 9, B. 11, C. 12, N. 14, O. 16, Fl. 19,	}	Hydrogens.
{	Na. 23, Mg. 24, Al. 27, Si. 28, P. 31, S. 32, Cl. 35.5,	}	
{	F 16, G 18, A 20, B 22½, C 24, D 27, E 30,	}	Vibrations.
{	F 32, G 36, A 40, B 45, C 48, D 54, E 60,	}	

Now it is to be understood from *Newlands'* point of view, that as $F32$ greatly resembles in *tonal effect* $F16$; and as $G36$ resembles similarly $G18$; and so on through the Octave; so in the chemical elements *Sodium* 23 resembles, in *physical and chemical features*, *Lithium* 7, and *Magnesium* 24 resembles in a similar way *Beryllium* 9; and so on also through the whole octave period. And not through these two octaves only, but up through the whole twelve octaves; certainly through those already known, and presumably through those as yet undiscovered.

Wurtz, in his work called "*The Atomic Theory*," after

tabulating the known elements, after Newlands, in octaves, says :—

"The *horizontal series* consists of elements resembling each other in their *atomic weights* ; and of which the properties are gradually modified so as to complete a period. The *Vertical Series* consists of elements connected by the *whole of their properties* and may be termed *Homologous*"

"We have given this table at length that the reader may estimate the true value of this attempt at *Classification*, which for the first time embraces all the elements known to Chemistry. The elements in the vertical series are *Natural Families*. This attempt, doubtless, still presents many imperfections, greatly due to the uncertain state of our present knowledge, especially with regard to rare elements. The imperfection is undoubtedly due to the fact that the *rate of increase in the atomic weight of elements which belong to the same horizontal series is altogether irregular.*" Li. 7, Be 9, B 11, C 12, Ni 14, O 16, Fl 19, here the rate of increase of the atomic weight is 2, 3, 1, 2, 2, 3.

Now this is very true and remarkable, and here I would remark that in the *musical octave* of notes, the *horizontal series*, there is also a *striking and significant irregularity*, both in the *increase of the number of vibrations* which truly produce the notes, and in *remarkable variation* of the *comma-distance** of the *intervals between* the notes in nature's ordinance, thus :—

C 24, D 27, E 30, F 32, G 36, A 40, B 45, C 48.

Notice, then, that here the *increase* in the *vibration numbers* is 3, 3, 2, 4, 4, 5. These are the ratios given pretty low down in the scale ; but it matters not what number we begin with at C, the numbers of the successive notes *must be in these ratios exactly* ; we have *no choice in this* ; *Nature is imperative in the matter of the ratios*. And it will be observed that the irregularity of which *Wurtz* complains is just one of the striking points of our analogy. And it is effectively seen

* This comma is the 53rd part of the octave.

when the octave which is divided into 53 commas is seen in the comma-distance of the intervals so measured, thus :—

G 8, A 9, B 5, C 9, D 8, E 5, F 9, G.

Now observe that this in the horizontal series of the musical octave confirms the analogy between musical and chemical elements as far as the *irregularity* which *Wurtz* supposes to be an imperfection in the increase of the atomic weights. Had that increase been *quite regular* there would then have been *imperfection*. The *inexactitude of increase of vibrations and atomic weights agrees*. But take the *vertical series* of which *Wurtz* says—“*The elements resembling in the whole of their properties may be termed Homologous*. The elements in the vertical series are *Natural Families*.” Now the elements of the musical vertical series are even more so.

$$\begin{array}{cccccc} \uparrow C & D & E F & G & A & B C \\ \downarrow C & D & E F & G & A & B C \end{array} \}$$

And so on through the whole twelve octaves. The resemblance in the vertical series here amounts to near *identity*.

We have not, however, seen the whole of the features of analogy between the elements of music and the chemical elements when we have seen Newlands' Law of Octaves; we come to what seemed to Mendelejeff a reason for departing from the simple “*Law of Octaves*,” and formulating “*Long periods*” containing 2 octaves, and 3 “*transitional elements*” between them—periods of 17 elements instead of only 7. Mendelejeff observed that *Potassium 39* Hydrogens, the first element in the third octave, had a more *pronounced resemblance* in properties to *Rubidium 85* than to *Cuprum 63*; Rubidium being the first element in the fifth octave, and Cuprum the first in the fourth octave. He therefore formulated the “*long period*” of 17 elements.

$$\left\{ \begin{array}{l} \text{K. Ca. Sc. Ti. V. Cr. Mn. [Fe Co. Ni.] Cu. Zn. Ga. Ge. As. Se. Br.} \\ \text{Rb. Sr. Y. Zr. Nb. Mo. ? [Ru. Rh. Pd.] Ag. Cd. In. Sn. Sb. Te. I.} \end{array} \right\}$$

Now although resemblance of properties is seen in the *short periods of octaves* all the way down through the twelve; yet this new feature in the nature of things warrants the further

arrangement in *long periods* of 2 octaves with a *triad* of *elements* coming between. This, which at the first glance seems to interrupt the analogy, on the contrary leads us to another very strong point of it; indeed the most deeply seated of all between the chemical elements and the elements of music. We have long periods in musical elements. Besides the short periods of octaves of notes we have the long periods of the chord scales in every complete scale of *Feminine* and *Masculine chords*; and between the two we have 3 *transitional elements* which has been called "*the defective triad*," being neither a minor nor a major fifth. Beginning with the subdominant or under chord of the Feminine phase of the scale, and proceeding through Tonic and dominant of it; then passing by means of the miscalled "defective triad" to the under or subdominant of the Masculine phase, usually called the major, we have the long period of the chord-scale thus in horizontal file:—

DF4, ACE, EGB, [BDF], FAC, CEG, GBD.

This *long period* arrangement to which Mendelejeff resorted for the reason mentioned, and without discerning the analogy existing between it and anything among musical element, being a *third point of analogy*, seems to go far to establish a purpose of the Builder.

We have called this view of *Classification* of the chemical elements *according to their atomic weights*, a *profound view*, inasmuch as *weight* which is *Gravitation* seems to be the great ruling force, not on the earth only, and not through the solar system only, but through the whole material universe, as Newton's profound research has shewn. We are told in the same precious old Book which tells us who the Builder is, that "He has weighed the mountains in scales, and the hills in a balance." And music, which is the most heavenly of earthly things, is produced by the play of *elasticity* against *gravitation*, that is *weight*. A vibrating string, for example, twanged by finger on harp, or bow on violin, or hammer in piano passes and repasses its centre of rest by the force of its *elasticity*; but every time it passes that centre its excursion is less, through the force

of *gravitation* dragging toward the centre of the earth ; and by-and-by its elasticity is overcome ; it ceases to vibrate ; the air which it had stirred resumes its equilibrium, and the sound ceases.

This beautiful analogy between *Music* and the *Chemical Elements* in their characters and resemblances as we have shewn, is deeply interesting further on account of this, there are just 12 *Scales* or *Keys* of Music, and, although in a different way, they also *go in pairs*, "the Minor and the Major" as they are usually called, but perhaps better named Feminine and Masculine as D. C. Ramsay, the profound Musical Scientist, prefers to call them. Each scale ascending is based on the fifth of the preceeding one ; and when we have ascended 12 *Fifths* we find that we have also ascended 7 *octaves* ; and that the 12th fifth and the 7th octave both terminate in a note of practically the same number of vibrations ; and so the cycle of the musical scales closes. To go on ascending would simply be to repeat the cycle in higher vibrations ; which musically, however, would be of no service because our ears are not fitted for more than the 12 pairs of relative scales. We cannot hear, indeed, with any great delight even the 7 *octaves* of vibrations which form the horizon of the musical system of vibrations. The sweetest scales are in the middle region, under the zenith of this horizon. So much for music and the chemical elements. We shall find music to meet us again later on, meanwhile we proceed.

Every building presupposes a *Builder* and a *plan* and *materials*. The grand old Book has told us who the Builder is. The plan on which He works we call familiarly "*the laws of nature.*" Very good. But laws *do nothing*. They are simply the way the Builder proceeds to do His work. The plan of a building, be it hut or palace, would lie long enough on the architect's shelf unless he were to proceed with action and intelligence to carry it out.

Now then we have got *materials* before us, the chemical elements, let us see how the building operation proceeds. The

next thing after the chemical elements are the crystals of which the primitive rocks are composed; for crystals are built of chemical elements; and rocks are built of crystals; and mountains, which are the primitive land, are built of rocks. It is an ascending scale of buildings.

The *Crystals* of which the Rocks are built are *very numerous* and we must be content with a very small sample. Let us take what comes readily to our hand. We cannot go far in Co. Down till we are in the midst of *Granite mountains*; nor can we take a long ramble in Co. Antrim till we are deep among the *Basalt* Dykes and Masses, with which very interesting rocks Antrim is specially rich. *Granite* and *Basalt* will serve us here. How, then, is granite built? As to the *place and manner* of the build of granite it seems to be deep down in the earth, and away from the *quick cooling* caused by exposure near the surface. It is called a *Plutonic* rock as distinguished from a *Volcanic* one; such as we have in the Basalts, called Volcanic because of being forced up to near the surface of the earth and more or less exposed to the rapid chilling of surface agencies. For this reason the chemical elements which build up Granites have plenty of time to crystallize; and so we find that Granite is composed entirely of crystals, not embedded in a cement or paste, like the crystals of Basalts, but jammed together and interlocked one with another; well formed, save as they confine each other by pressing contiguity.

And now as to the *materials* of granite. Granites are built chiefly of *Quartz*, *Felspar*, and *Mica* crystals; many varieties of these plutonic rocks have various additional elements, but *these three* are the chief. And now considering only those three let me try to give you some idea of the wonderful complexity and harmony of their build.

In brief, at this point, the way to read the musical notes of any crystal may be illustrated thus:—take Quartz, it is composed of Silicon and Oxygen. Silicon is the *fourth* element in the second octave of Mendelejeff's table of the elements; and Oxygen is the *sixth* in the first octave. Now the *fourth* in the

musical major scale is Fah, and the *sixth* is Lah. In short by taking Mendelejeff's table in the one hand and the major scale of *C* in the other, turn to Felspar and Mica and take the chemical analysis of these in some of the chemical works on Mineralogy. We find *Felspar* composed of Potassium 39, the first in the third octave ; Calcium 40, the *second* in that same octave ; Aluminium 27, the *third* in the second octave ; Silicon 28, the *fourth* in the same octave ; Oxygen 16, the *sixth* in the first octave.

Doh Re Mi Fah—Lah.

Mica is Potassium, Calcium, Aluminium, Silicon, Oxygen, which correspond to the elements of Felspar, only they are built in different proportions, and Magnesium 24 is added, so the corresponding musical notes are much the same, only the melody of the *composition* must be different. The *Basalts* are much more complex than the Granites, and they are in great variety. Here we have Augite, Felspar, Olivine, Leucite Nepheline, &c., now in illustration take *Augite* ; Phillips gives Silicon, Aluminium, Calcium, Magnesia, Iron, Manganese, and Oxygen. Now Calcium 40 is the *second* in the third octave ; and Magnesium the *second* in the second octave ; Aluminium is the *third* in the same octave ; Silicon is the *fourth* in the same octave ; Oxygen is the *sixth* in the first octave ; and Manganese 55 is the *seventh* in the third octave.

Re Re Mi Fah—Lah Te.

These illustrations may suffice to shew the *method* by which the notes of any crystal may be come at ; and these notes must be *composed* into an air or built into chords, so as to feel the harmony as well as the melody of the crystal, for the crystal also is a *composition*. Thus we see the crystals of granite or basalt and the scales or chords of music facing each other like the two leaves of a book, so that we may gaze and listen to the silent music of the still earth ; so deeply and intrinsically does music enter into the hidden secrets and unvoiced harmony of its rocky foundations. It is remarkable that such a substantial thing as granite or basalt should have their crystals built of

chemical elements of comparatively light atomic weight, and belonging to the first three octaves of these elements. The further we go up these chemical octaves the heavier do the elements become. Thus far, we have only got the length of Iron, which is 56 Hydrogens ; while Thorium and Uranium, the *fourth* and *sixth* of the *eleventh* octave are respectively 232 and 239·8 Hydrogens.

And now, are these chemical elements themselves also buildings?

Norman Lockyer says, in an article in *The Nineteenth Century* for 1879, on "the Chemical Elements." "I have recently announced to the Royal Society that, reasoning from the phenomena presented to us in the *Spectroscope* when *known compounds* are decomposed, I have obtained evidence that the *so-called elementary bodies* are in reality *compound ones*. The *spectra* of the *sun* and the *stars* have all been recorded and considered ; and in the science of *Comparative Stellar Chemistry* it has been stated that there are *Four Genera* of stars recognisable by their spectra. In the brightest, and presumably the *hottest* genus, the atmosphere consists of only 2 *substances*, *Hydrogen* and *Calcium*. In the *second* genus of stars, and *our sun* belongs to this second genus, Hydrogen, Calcium, Magnesium, Sodium, &c., come in. In the *third* genus the chemicals discovered are those of *increasing atomic weight*, and *Hydrogen*, the lightest, *disappears*. And in the *Fourth* genus, the *coolest* of the stars, there are *fluted spectra* of metals and metaloids." He adds, "I have no hesitation in stating my opinion, that in this line of facts, we have the most important outcome of *Solar work* during the last ten years ; and if there were none others in support of them the conclusion would still stare us in the face that the running down of temperature in a mass of matter is accompanied by a gradually increasing complexity of chemical forms." And Lockyer adds—"that in this work experimentalists have taken for granted that in the spectrum thus produced they have been dealing with the *Vibrations* of one specific thing, call it atom, molecule, or what you will,

usually called the *Chemical elements* ; and that the *vibrations* of these specific molecules have produced all the Fraunhofer lines which they have persistently seen and mapped in each instance." In the article from which I have made these quotations, N. Lockyer details an immense number of experiments which lead him to "the conclusion that the *so-called elements of chemistry* are *not simple* but are *compounds*." They may, in some cases be compounds, but I intend, if time permit, and your patience, to suggest what has been already hinted at by more than one expert, that even those which are *not compounds* are still *buildings* built up of the *ultimate substance* of the material creation, the all-pervading *ether*.

This conclusion of Lockyer's when followed in the other direction, namely, the *running up of temperature* to its most intense degree will be found when we attain to the evidence of it experimentally, to resolve everything which we have been accustomed to call chemical elements into something more elemental still, truly elemental in the great sense—the element of Ether ; and that the building up of the chemical molecules out of this ultimate element is conducted by the *great Builder*, who is called in the Liturgy "a *Lover of Concord*," on the same lines as our *Music of the air and in the ear*, that we are beginning to find embodied also, though unheard by mortal ears, in the build of the crystals of the rocks which build the great globe itself.

Professor *Henri Hertz*, in "*La Revue Scientifique*," October 26, 1888, says, "The nature of *electricity* is another problem which recalls us to the condition of electric and magnetic forces through space. Behind this question arises the most important problem of all, that of the nature and properties of the substance which fills all space—the *Ether*, its structure, its motion, its limits, if it possesses any. We find this subject of research day by day predominating over all others. It seems as if a knowledge of *Ether* should unveil to us the *essence of matter* and its inherent properties, weight and inertia. Soon the question set by modern physics will be 'Are not all things due to conditions of *Ether* ?'"

But more heat in the *running* of temperature is, perhaps, not the power by which chemical elements will ever be decomposed and reveal to us that primitive protoplasm out of which they have been built up. You observe that all experimentalists speak of *Vibrations* as existing in both chemical compounds and chemical elements. The elements are considered to be in a state of *intense vibration* even in the most seemingly *solid* of substances. This, of course, is not a new view; but there are new views connected with this doctrine of Vibrations. There is a force which we might venture to call the *Generic force*, of which *heat* is only one of the *species*, it is called the force of *Sympathetic Vibrations*.

Tyndall in his book on "*Sound*" has a part devoted to this subject of "*Sympathetic Vibrations*," and in the course of his beautiful illustrations of it he uses this one—"Holding a vigorously vibrating tuning fork in my hand, I bring one of its prongs near an unvibrating one, placing the prongs back to back but leaving a space of air between them. The perfect unison of the two forks enables the one to *set the other into Vibration*. And although we stop the sound of the fork we had struck, the other, which a moment ago was silent, continues to sound, having taken up the *Vibrations* of its neighbour."

In operating this law of *Sympathetic Vibration*, Keely, of Philadelphia, in his researches and inventions, has made a vibrating apparatus by which he can produce very *intense velocity of vibrations*; and by bringing this silent musical apparatus into action he has accomplished the decomposition of chemical elements with a view of obtaining the *latent force* aggregated in the course of their construction by the great Builder of all things, that he might use it in running the machinery of his workshop, and with the anticipation of giving these hidden forces to the world for the use of man in travelling, and in mechanical operations. Professor Fitzgerald, of Dublin, who is acquainted with Keely's labours and discovery, says:—"We seem to be approaching the theory of the constitution of the *Ether*." Professor Hertz has produced vibrations vibrating

more than 100,000,000 times in a second of time ; but Keely, who has outrun all researchers on these lines, has produced 700,000,000 vibrations per second by his marvellous instrument. John Worrell Keely, who is now recognised as a great discoverer on the lines of *Sympathetic Vibration*, has constructed an instrument by which he can produce and register as many as 700,000,000 vibrations per second. Speaking of this operation on water, Keely says :—"The peculiar conditions in the gaseous elements of which water is composed as regards the different atomic volume and weight of its gases makes it a ready and fit subject of vibratory and research. In submitting water to the influence of vibratory transmission, even as *Simple Thirds*, the high action induced on the *Hydrogen* in contrast with that on the *Oxygen*, under the same vibratory stream, causes an antagonism to arise between these elements that induces their dissociation as water, and they are rearranged in some subtle manner. The new gaseous element thus induced and registered shows thousands of times greater force as regards tenuity and volume than that induced by the chemical resolution. In all molecular dissociation of both simple and compound elements, gaseous or solid, a stream of antagonistic vibrations, *Thirds*, *Sixths*, or *Ninths* on their Mass-Chord will compel progressive sub-divisions. In the disintegration of water, the instrument is set on *Thirds*, *Sixths*, and *Ninths*, to get the best effects."

. After details and description as to how to operate the instrument, Keely goes on to say :—"When the note of the Syren becomes concordant with the neutral centre of the disintegrator the *highest order of sympathetic communication is established* . . . complete disintegration *will follow in triple progression* ; thus first, by the *Thirds* comes *molecular disintegration*, resolving the water into a *gaseous compound* of the Hydrogen and Oxygen. Secondly, by the *Sixths* resolving this compound into a *new element*, by second order of dissociation, producing what I call *low atomic Ether*. Thirdly, by the *Ninths*, this *low atomic Ether* is again resolved into a new element, which I call the high or second atomic." By Thirds, Sixths,

and Ninths, Keely is here speaking of what is away up in the utterly inaudible region of vibrations produced by hundreds of millions per second.

And now having brought before you Keely's *Analytical* operations reducing *Oxygen* and *Hydrogen* into the three orders of etheric condition which have just been described ; let me try to state, as briefly as possible, the attempt of Dr. MacVicar, who was at once a great Chemist and a great Philosopher, to construct the chemical elements theoretically out of the Ether; an *a priori* effort.

Inasmuch as all germinal objects in nature are in the form of a cell, be it *egg* or *seed* or *spore* the Doctor presumes to say that the *ether*, which is the *germinal beginning* of all, must be considered also as being an *elastic cell* of inconceivably small dimensions. These etheric cells are all, in their first and most ultimate condition, *equal* in *every way*. By motion among them they bound against each other and rebound, just as in the larger sphere of the atmosphere the gaseous elements of the Nitrogen and Oxygen do. He says—"The etherial elements, the *minima naturae*, still have a certain amount of power to maintain their *individuality*. But they cannot refuse to obey the action of the cosmical law which calls for unification. Hence they come together ; they form not yet a *material molecule*, only an *etherial one* which we may call a *nebular speck*. The nebular speck of ether increasing by additional cells of ether which set up a pressure toward the centre of the group, causes the central cells to coalesce, not having sufficient power to maintain their individuality ; so there arises a nucleus of confluent cells, surrounded with an atmosphere of normal cells clinging to it. This new thing he calls the *material speck*, which is yet a long way from being even the lightest of chemical elements, the Hydrogen ; but it is on the way to the construction of Hydrogen. These material specks are conceived to be of two forms of arrangement of the cells of ether ; and, as we find in the region of *sex* in all organic things, these two forms couple, and stand vibrating infinitesimally near each other, and in

perfect harmony of vibration. The *confluent atmospheres* of the two form an ellipse ; but nature's most perfect form is the sphere or globe, so two of these couples tend to couple again ; and standing across each other the four centres vibrate toward each other yet more perfectly, and the four atmospheres of free ether constitute a spherical structure. This the Doctor conceives to be a hemiform element, a Tetrad, two of which again coupled becomes the chemical element *Hydrogen*.

And now I must draw to a close, though much that might help to elucidate this subject has been left aside. And as I am quite aware that I have travelled into new ground, and into an as yet *terra incognita*, I shall not be surprised if any or even if many of you, ladies and gentlemen, may be more startled than edified by my paper. I have sought to make you feel that the whole creation is in a constant state of vibration, and that the law of these vibrations, inaudible as well as audible, is that of the heavenly aesthetic order which is brought to our ears within the horizon of the *Musical System of Vibration*.

At the close of his chapter on *Mendelejeff's Periodic Law*, Newth says, "No satisfactory theory has yet been offered to explain the law of chemical periodicity." (p. 109.) It seems to me that its *analogy* to the *law of the Musical Octave* and the *Musical Chord Scale* which I have pointed out, and which again Mr. Keely's discovery in the region of *Vibratory Physics*, shows to hold perfectly in the *arcane interior of the Chemical atoms*, suggests for this region also the *theory* of the *Musically harmonic basis of all Creation*.

The whole subject awaits further research, and further insight into the nature of things ; but it may be worth while to allow the analogy here worked out to stand as a *waymark* which can be taken down and cast aside if it should in course of discovery be found misleading.

27 January.

The President, Lavens M. Ewart, in the chair. F. J. Bigger, honorary secretary, read a paper on "The Discovery of a Souterrain at Stranocum." in the demesne of W. Ford-Hutchinson, which was illustrated by a number of excellent drawings and sections made by W. J. Fennell, and by numerous photos taken by Alex. Tate. This souterrain has already been described in the *Ulster Journal of Archaeology* for April, 1897, so that it is unnecessary to repeat the description. After some remarks by F. W. Lockwood, J. Cunningham, Alex. Wilson, John M. Dickson, and others, the president called upon Dr. W. Donnan to read a communication on "Fresh-Water Algæ." Dr. Donnan began by showing the ease with which the study of these lowly forms of life may be carried on, as every pool or sheet of standing water teems with them. He then briefly described their position in the vegetable world, coming among the thallophytes, there being no distinction between leaf and stem. They are distinguished from the fungi (the other large group of thallophytes) by possessing chlorophyll, the green colouring matter which gives to plants their power of digesting mineral substances. They are cellular plants, with cell walls of cellulose, of which also paper is made; many of these cell walls exhibit the most beautiful forms, and the effect is often increased by the arrangement of the chlorophyll grains in strings and spirals through the cells. Dr. Donnan then described some of the more familiar and beautiful of the fresh-water algæ, such as the *Pleuracoccus*, which forms a green scum on standing water. The "red snow" and "gory dew" are forms of algæ with reddened chlorophyll. They usually multiply by simple division into two halves, each of which goes and does likewise, *ad infinitum*, but it sometimes happens that zoospores are formed by the breaking up of the protoplasmic chlorophyll. Each zoospore has two ciliae, by which it can swim about until they are ready to settle down as members of the ordinary community of protacocci. Closely allied forms are the desmids and the

diatoms, whose flinty skeletons are such favourite microscopic subjects, their great beauty being permanent. The plant has two sides, fitting one into the other like the halves of a pillbox, between which is the protoplasm and chlorophyll. In Virginia there is a famous deposit of diatoms eighteen feet thick. *Volvox*, the beautiful revolving sphere, was next described in detail, and also *Batrachospermum*, which is interesting as being allied to the marine red seaweeds. Two or three alternative methods of preserving these algæ were explained, and the paper was concluded. Dr. Donnan then appealed to members interested in microscopic work to co-operate with him in reorganising this branch of the club's work. The various algæ described were then exhibited under microscopes by Dr. Donnan and inspected by the members. After the election of three new members, the meeting closed.

16 February.

One of the most enjoyable evenings of the winter session of the Club was held on Tuesday last, when a joint meeting of the Geological and Botanical Sections of the Club took place in the Museum.

The PRESIDENT (Lavens M. Ewart) opened the proceedings by calling upon the Geological Secretary to read the report of the season's work (see page 386).

The Vice-President (the Rev. C. H. Waddell, B.D.) then read a paper on the geological history of plants. He began by remarking that his intention was only to give a rough sketch of the subject, which was too large for a short paper, and which would require special knowledge. The study of fossil plants is peculiarly difficult owing to the bad preservation of most of the specimens. It is striking to notice how recently vegetation has become truly beautiful. The great forest trees of Carboniferous and Devonian times were to our ideas weird and uncouth. There are differences in type in various countries, as well as in various ages, and of these one of the most apparent is Australia,

where the archaic types of the flora as well as the fauna give a peculiar appearance to the scenery. It seems also curious that these older floras are apparently unable to fight against alien plants from more highly-developed countries. Reference was then made to an interesting diagram on the wall, showing the relative abundance of types during geological time, so far as known. Palæozoic floras are characterised by cryptogams, giant in size, but structurally the same as our little club mosses. Mesozoic botany is also typically composed of conifers and cycads, and at length we come to the modern types of mono and dicotyledonous plants. The Rev. C. H. Waddell then pointed out the difficulty of determining the lower plants at all, several supposed algæ having proved to be of animal origin. Owing to the inability of animals to produce chlorophyll (the means by which minerals are turned into living matter), plants must have preceded animals, and Sir William Dawson and others believe that the beds of plumbago in the archæan rocks of Canada are due to deposits of plants. Characteristic coal plants are lepidodendron, sigillaria, with its roots, known as stigmaria, formerly thought to have been a separate plant, and calamites, allied to our horsetails. Coming to more modern deposits, the leaf beds of Ballynallady are interesting relics of a past flora, including plants that are now tropical, American, or Japanese. S. Gardiner, in a paper read before the Club, says that the flora is mainly coniferous, a cypress, a pine, and a cryptomeria being plentiful. Willow, oak, beech, magnolia, &c., also occur. A very interesting point in fossil botany is the vicissitudes of climate undergone by any one country, as for instance in Greenland there are tropical plants to be found fossil. It is usually hard to find out what changes have gone on in any one family of plants, but one example is the fact that the common flax is a totally distinct plant from any known wild variety, while at the time of the lake dwellings in Switzerland a much smaller and poorer wild flax was the only available one.

A short discussion followed this paper.

Richard Hanna then read a paper on alien plants, or plants which have been artificially introduced. The number and variety of these may be imagined from the fact that 188 species are given as alien in the London catalogue. 141 species have been found in Down, Antrim, and Derry alone. R. Hanna said his attention was first called to the subject some ten years ago, and since then he owed much to S. A. Stewart and R. Ll. Praeger for their help in naming doubtful plants. The hunting-ground is to be found at the heaps thrown out by flour mills and distilleries, also in fields and districts known to have been sown with foreign grass and other seeds, among which many interesting plants often occur. The majority of these alien plants are annuals, but biennials and perennials also occur. R. Hanna then detailed some of his most interesting finds, including the London rocket, which grew so abundantly in the ashes of the great fire of London. It is a curious coincidence that it was first seen here on the ashes of a great heap of damaged flour near Hughes's flour mill. All the native sisymbriums grow there, but it is largely filled up and built over now. *Hyoscyamus niger* is also common at the Royal Irish Distillery, and it is of interest to note that it is perennial both there and in other places where it had been seen. It is curious also that from a large quantity of seed collected in 1894 and sown in various good places not a plant germinated. A number of other plants were described, several specimens being on the walls.

Some lantern slides by R. Welch, W. J. Fennell, Wm. Gray, J. St. J. Phillips, and other members, were next displayed by Lizars. They included slides of a series of dykes, glacial beds, glaciers, rock specimens, and features of local geology; also some of the Kerry bogslide.

A number of exhibits of geological and botanical subjects were arranged in the lower room. There was also on view the new slicing machine for cutting rock sections, recently presented to the Club by Combe, Barbour, and Combe, and made by them to the design of H. J. Seymour, who explained its action to a large number of members.

The following is a list of some of the more important exhibits :—Series of fossils from chalk, greensand, and lias of Ireland and parts of England, by R. Bell; plant remains from Ballypallady, &c., and from Museum varieties of silica, by H. J. Seymour; living cycads and igneous rocks, by A. G. Wilson; fossils from carboniferous, lias, &c., by William Gray; erratics from Club collection; mycellium of fungus in wood and *Rubus drigeri* var *Hibernicus*, by the Rev. C. H. Waddell; fossil wood from West Indies and Lough Neagh. There were a number of other exhibits.

Two new members were elected, and the meeting concluded.

16 March.

The President in the chair. The following paper was first read :—"The re-discovery of *Dryas Octopetala* in the County Antrim," by the Rev. H. W. Lett, M.A., M.R.I.A. The plant *Dryas Octopetala* or Mountain Avens, is mentioned in Mackay's Flora Hibernica in 1836, as having been found in the County Antrim by Templeton. The specimen does not exist, and there is no note in Templeton's MSS. about this plant from County Antrim, consequently the editors of the Flora of the North East of Ireland, in 1888, excluded it with the remark—'Mr. Templeton is erroneously credited with finding this plant in County Antrim.'

Now, while collecting mosses on the 19th of March, 1884, at the Sallagh Braes in County Antrim, I found *Dryas* growing and took this specimen which I labelled, and put aside, and as I was working at cryptogams, I forgot it till July, 1896, when it turned up in my Herbarium.

A note of mine embodying these facts appeared in the *Journal of Botany* for August of last year. To me it was very interesting to have verified Templeton's accuracy by the rediscovery.

The editors of the *Irish Naturalist* took exception to my

good faith in this matter in that publication for October, 1896, and gave their reasons, the principal one being, that—"the Sallagh Braes have been well searched by botanists ever since Templeton's time notably by the late Dr. Moore." Therefore, in the opinion of "Irish Botanists" for whom they authoritatively spoke, my specimen of *Dryas* came from some other place and I have foisted it into County Antrim.

But my finding of this plant at Sallagh Braes was genuine, and the plants still flourish there and I hope long will, and that our local botanists will refrain from collecting specimens of it from Sallagh Braes.

Being in that neighbourhood in November, 1896, I went to the spot where I knew it grew, and had the pleasure of seeing *Dryas* flourishing. I brought this scrap—I know I was wrong to do so—to show to the Members of the Club as I felt it was due to them to convince them, if necessary, that I was not guilty of having committed a botanical fraud.

Hamilton M'Cleery afterward proceeded with his lecture "An Evening with the Microscope—how and what to see." The Lecturer dealt with the structure of microscopes and the different subjects of interest to the student. The lecture was fully illustrated by lantern slides.

ANNUAL MEETING.

The thirty-fourth Annual Meeting of the Club was held in the Museum on the 13 April, when Dr. C. H. Hurst delivered a lecture upon "Organization in Club Work," fully illustrated by lantern slides. The lecture treated of the work done by the Liverpool Biological Society in the Irish Sea, and was of an instructive and practical character, giving the members much assistance in any future dredging excursions they may undertake.

The Secretary read the Report of the year's work (see page 329).

The Treasurer read the statement of accounts (see page 332).

These two items were passed—some regret being expressed

at the latter being on the wrong side, which was accounted for by the heavy expenditure occasioned by last year's Appendix.

On the motion of Wm. Gray, seconded by J. St. J. Phillips, the President (Lavens M. Ewart) was re-elected. On the motion of Dr. Donnan, seconded by T. W. Foster, the Vice-President (The Rev. C. H. Waddell, B.D.) was re-elected. On the motion of W. H. Phillips, seconded by Alec. G. Wilson, the Librarian (Wm. Swanston) was re-elected. On the motion of W. J. Fennell, seconded by F. J. Bigger, the Treasurer (W. H. Phillips) was re-elected. The following were elected as the Committee on the motion of R. Hanna, seconded by John Hamilton :—W. J. Fennell, William Gray, John Hamilton, F. W. Lockwood, S. A. Stewart, Miss S. M. Thompson, John Vinycomb, Robert Welch, Alec. G. Wilson, and Joseph Wright.

Alec. G. Wilson tendered his resignation as Secretary, which was accepted with regret. Francis Joseph Bigger was re-elected with J. St. J. Phillips on the motion of Robert Welch, seconded by John M. Dickson.

REPORT OF THE GEOLOGICAL SECTION FOR 1896-7.

In presenting their fourth Annual Report the Committee of the Geological Section have to record a year of continued activity both in field work and in the practical study of rocks and fossils, the Evening Monthly Meetings having been well attended, the Members contributing the results of their individual labours in many districts of Ireland. Several excursions to places of geological interest were organized, only two of these being spoiled by the exceptionally wet weather. The search for *Trilobites* at Pomeroy had to be abandoned, as the fossiliferous ordovician rocks there occur in the bed of a stream ; and an excursion to Glenavy in search of plant remains proved abortive owing to the flooded condition of Lough Neagh. A fresh impetus was given to study our Cretaceous rocks by Dr. W. Fraser Hume's visit to Belfast in 1895, which was renewed by his second visit last summer, when several Members of the

Club had the opportunity of accompanying him on his visits to our best sections. Whilst anxiously awaiting the publication of his results, it is pleasant to find that Robert Bell has forwarded to Dr. Hume, amongst many other fossils from Squire's Hill, the first recorded specimens of *Holoaster lævis* var. *planus* and *Belemnitella Alfredi* ever found in Ireland. The desire to obtain fossils from the basal cretaceous beds of Murlough Bay resulted in a successful and largely attended excursion to that lovely district on last Easter Monday.

Once more Professor Cole has visited Belfast, conducting the classes that have now become an annual institution invaluable to the students of petrography, and not less useful to those who care especially to study the relations of various types of rock to one another in the field. Many valuable gifts have been received on behalf of the Club, foremost amongst them is the valuable and beautiful rock-slicing machine, presented by Combe, Barbour, & Combe, who made it after the design of Henry J. Seymour, a member of the Dublin Club, whose temporary residence in Belfast has cemented the friendly feeling between the two clubs. A fine series of specimens procured by L. M. Bell, C.E., from the new waterworks tunnel at Newcastle, show the ordovician slates hardened and altered by intrusive veins and patches of fine-grained Mourne granite, the study of these interesting sections should not be neglected by the Geological Members of the Club, as the opportunity is unique, and may never occur again. Robert Bell's interesting discovery of fire opals in the rhyolites of Sandy Brae, must be recorded, as well as a bed of beautifully perfect leaf remains on the shores of Lough Neagh between Toome and Randalstown. The bed has evidently been preserved by a covering of boulder clay which is still visible further inland, erratics lying over the leaf beds seeming to be the remnants of its former extension to the lake. Cranfield point lies about half a mile north east of the bed, which deserves further investigation, only R. Bell and S. A. Stewart having as yet visited it.

EXCURSIONS.

- 6 April, 1896—Murlough Bay. Cretaceous rocks.
- 16 May, „ —Squire's Hill Quarries. Cretaceous rocks.
- 13 June, „ —Woodburn. Cretaceous rocks.
- 18 July, „ —Glenavy. Leaf remains.
- 12 Sept., „ —Kilroot and Whitehead. Trias and Cretaceous rocks.
- 10 Oct., „ —Marino. Carboniferous beds.
- 26 Dec., „ —Dromore. Glacial.
- 13 Feb., 1897—Cloughfin. Glacial.
- 6 March, „ —Squire's Hill. Igneous quarries.
- 13 „ „ —Orlock. Dykes in Ordovician rocks (Lamprophyre, etc.).

GEOLOGICAL CLASSES CONDUCTED BY PROFESSOR COLE.

A series of six lessons on blowpipe work, flame tests and other methods employed in the examination of rocks was held in the Club's rooms at the Museum, three field lessons were also conducted as follows :—

- Tuesday, 30 March—Whitehead and Blackhead.
- Thursday, 1 April—Ballypalady and Templepatrick.
- Saturday, 3 „ —Castlewellan and Newcastle District.

A public popular lecture on *The Building of Ireland ; the landscape and the ground beneath it* was delivered by Professor Cole in the Grosvenor Hall, under the auspices of the Club, the Lord Mayor of Belfast being in the chair. It is gratifying to record that this lecture which was intended to bring scientific instruction about our native land within the reach of every citizen in Belfast was cordially appreciated, the lecture being well attended by an attentive and enthusiastic audience.

GLACIAL GEOLOGY.

In response to a request from Percy F. Kendall, F.G.S., Secretary of British Association Erratic Blocks Committee, a series of samples of boulder clays from various localities in our district were forwarded to him by Members of the Section. An inquiry from J. Kilroe (*Geological Survey of Ireland*) as to whether any distinction could be drawn between upper and lower

boulder clays in our district could only obtain a negative, no such difference having as yet been satisfactorily established.

The area of distribution for Ailsa Craig riebeckite-eurite has been largely extended during the past year, specimens having been found as far west as Portrush by R. Welch, who also obtained two specimens when dredging in 45 fathoms off Rathlin. These three erratics were submitted to W. W. Watts, F.G.S., of Jermyn St. Museum, through whose kind offices specimens of the riebeckite-rocks of Skye and Ailsa were obtained last year; his verdict is that all three are from Ailsa Craig, the other specimens have been examined by Prof. Cole. The dredged pebbles present the intensely worn and rounded appearance usual in these Ailsa erratics. A. G. Wilson found the eurite in the esker sands of Ballylessan, Robert Bell in Colin Glen, at Glenavy, in esker gravels near Antrim and in boulder clay on the Black Mountain, Miss M. K. Andrews on the shore at Kilkeel, whilst a specimen was extracted by the writer from the boulder clay in Dromore brickfield. Owing to unforeseen delays in tabulating the results of last season's glacial observations it is unfortunately necessary to reserve the lists until next year's report.

GIFTS TO THE SECTION.

The thanks of the section are due for the following valuable gifts:—

Coombe, Barbour & Coombe, Rock-Slicing Machine. *Professor Grenville A. J. Cole, M.R.I.A., F.G.S.*, Specimen of variolite from Dyke near Annalong—"The Rhyolites of County Antrim, with a note on Bauxite." *Sc. Trans. Roy. Dub. Soc.*, Vol. VI. (Ser. II.). *J. Nolan*, Geol. Survey of Ireland; New Index Map of Ireland, with districts included in memoirs specially coloured by hand. *H. M. Platnauer*, York Museum, Erratic of Shap Granite found in Yorkshire drift. (per Miss M. K. Andrews.) *F. W. Lockwood*, Collection of Fossils from Red Crag of England. *J. O. Campbell, B.E.*, Granite from Shap and Ross of Mull. *R. Bell*, Collection of

Rhyolites from County Antrim. *R. Lloyd Praeger, B.E., M.R.I.A.*, "Report upon the raised beaches of the North East of Ireland." Proc. Roy. Ir. Acad., 3rd Ser., Vol. IV., No. 1. *W. W. Watts, F.G.S.*, "British Geological Photographs." From Geol. Mag. of Jan., Feb., and March, 1897. To Miss M. K. Andrews, L. M. Bell, R. Bell, J. O. Campbell, G. MacLean, and A. G. Wilson, for numerous additions to the collection of Irish rocks.

Zittels' "Handbuch der Palæontologie," and many requisites for the practical work carried on at the evening meetings have been purchased during the year.

SYDNEY M. THOMPSON,

Hon. Sec. of Section.

REPORT OF THE BOTANICAL SECTION.

Monthly Meetings have been held regularly during the winter, and a considerable amount of work has been done in the study of some of the native natural orders. Although the attendance has not been large, it has been constant and interest has not flagged.

At the Meeting in October a presentation was made to S. A. Stewart, F.B.S.E., by Members and other friends, of the first portion of a beautiful mounted set of British Hawkweeds, now being issued by Messrs. Linton, in recognition of his services to Irish botany and especially in the genus *Hieracium*, and of their affection and esteem.

The want was felt at these Meetings of a set of mounted plants which would be always at hand and easily accessible to illustrate the lectures. Miss S. M. Thompson kindly presented a collection of 433 plants for this purpose, which has been further supplemented by a gift of plants from Miss M. Knowles. Others are promised, and we hope members will try to fill up the gaps and make the collection complete. Some books of reference are also much required for use at the Meetings, and one or two have been acquired for this purpose.

NOTICE.

EXCHANGES OF PROCEEDINGS.

Barrow Naturalists' Field Club.

Annual Report and Proceedings, Vol. XI.

Bath Natural History and Antiquarian Field Club.

Proceedings, Vol. VIII., No. 3.

Belfast—Natural History and Philosophical Society.

Report and Proceedings, 1894-95.

„ Ulster Journal of Archaeology.

Vol. II., Part 4, Vol. III., Parts I., II., III.

Brighton and Sussex Natural History and Philosophical Society.

Abstract of Papers and Annual Report, 1896.

Bristol Naturalists' Society.

Proceedings, Vol. VIII., Part I.

List of Members.

Canadian Institute.

Transactions, Nos. 8 and 9.

Cardiff Naturalists' Society.

Report and Transactions, Vol. XXVII., Part II., Vol. XXVIII., Parts 1 and 2.

Cornwall—Royal Institution of.

Journal, Vol. XII., Part 2—Vol. XIII., Part 1.

Costa Rico—Museo Nacional de Costa Rico, Informe presentado al senor Secretario de Estado en el despachs de Fomento. And other papers.

„ Primera Exposicion Centioamencana de Guatemala Documentos.

Dublin—Royal Irish Academy.

Proceedings, 3rd Series, Vol. IV., No. 1.

„ Royal Society of Antiquaries of Ireland.

Journal, Vol. VI., Parts 2, 3, 4.

„ Naturalists' Field Club.

Annual Report, 1896.

Edinburgh—Botanical Society of.

Transactions and Proceedings, Vol. XX., Parts 2 and 3.

Frankfort—Helios.

Jahrgang 13, Nos. 7 to 12.

„ Societatum Litterae.

Jahrgang IX., Nos. 10 to 12, Vol. X., 1 to 6.

„ Senckenbergische naturforschende Gesellschaft

Bericht, 1896.

Glasgow—Natural History Society.

Transactions, Vol. VI., Part II.

„ Philosophical Society.

Proceedings, Vol. XXVII.

„ Geological Society of.

Transactions, Vol. X., Part 2.

Halifax, N.S.—Nova Scotian Institute of Science.

Proceedings and Transactions, Vol. IX., Parts 1 and 2.

Hamilton Association.

Journal and Proceedings, No. XII.

Hertfordshire Natural History Society.

Transactions, Vol. VIII, Parts 8 and 9, Vol. IX., Parts 1, 2, 3.

Leeds Philosophical and Literary Society.

Annual Report, 1895-96.

Liverpool Geological Society.

Proceedings, Vol. VII., Part 4.

London—Geologists' Association.

Proceedings, Vol. XIV., Parts 8, 9, 10, Vol. XV., parts 1 and 2.

„ British Association for the Advancement of Science.

Report, 1896.

London—Reliquary and Illustrated Archæologist.

Vol. II., Nos. 3—4 ; Vol. III. Nos. 1—2.

„ Trustees of British Museum.

General Guide to Nat. Hist. Department.

Guide to the Fossil Mammals and Birds.

„ Reptiles and Fishes.

„ „ Part II.

„ Mineral Gallery.

Students' Index to the Collection of Minerals.

Introduction to the Study of Minerals.

„ „ Rocks.

„ „ Meteorites.

Guide to the Galleries of Mammalia.

„ „ Reptiles and Fishes.

„ „ Shells and Starfishes.

„ Sowerby's Models of British Fungi.

„ British Mycetoza.

„ Fossil Invertebrates and Plants.

Manchester Field Naturalists' and Archæologists' Society.

Report and Proceedings, 1895.

„ Microscopical Society.

Transactions, &c., 1895.

Montevideo—Museo Nacional de Montevideo.

Anales, V. and VII.

Norfolk and Norwich Naturalists' Society.

Transactions, Vol. VI., Part 2.

Paris—Société Zoologique de France.

Four Papers.

St. John's, N.B.—Natural History Society.

Bulletin, No. XIV.

Stavanger—Museum.

Aarsberetning for 1895.

Wiltshire Archæological and Natural History Magazine.

Vol. XXVII., No. 85.

Catalogue of Antiquities in the Museum at Devizes, Part I.

Warwickshire—Naturalists' and Archæologists' Field Club.

Proceedings, 1895 and 1896.

Yorkshire Naturalists' Union.

Transactions, Part 20.

Carboniferous Flora, by Robert Kidston, F.R.S.E., F.G.S.

U.S.A.—Boston Society of Natural History.

Proceedings, Vol. XXVII.

„ Chapel Hill N.C.—Elisha Mitchell Scientific Society.
Journal, Vol. XII., Part II.

„ Chicago—Academy of Sciences.
Lichen Flora of Chicago and Vicinity.
Annual Report, 1896.

„ Meriden—Scientific Association.
Transactions, Vol. VII.

„ Minnesota—Geological and Natural History Survey.
Annual Report, 1898-94.
Geology of Minnesota, Vol. III., Part 1 of the Final Report.

„ New York—American Museum of Natural History.
Bulletin, Vol. VIII.
Annual Report, 1895.

„ Philadelphia—Academy of Sciences.
Proceedings, 1896, Parts 1, 2, 3.

„ Rochester—Academy of Science.
Proceedings, Vol. III., brochure 1.

„ Salem—American Association for the Advancement
of Science.
Proceedings, 1895-96.

„ Staten Island Natural Science Association.
Proceedings, Vol. V., Nos. 8-10; Vol. VI., No. 1-6.

„ Washington—Smithsonian Institution.
Report, 1894.

„ „ United States Geological Survey.
Annual Reports, 1893, 4, 1894, 5, and
1895-6, Parts, 1-11.

BELFAST NATURALISTS' FIELD CLUB.

THIRTY-FIFTH YEAR, 1897-98.

LIST OF OFFICERS AND MEMBERS.

President:

LAVENS M. EWART, M.R.I.A.

Vice-President:

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Treasurer:

W. H. PHILLIPS,
8 CHICHESTER STREET.

Librarian:

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QUEEN STREET.

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J. ST. J. PHILLIPS, A.R.I.B.A., 20 UNIVERSITY SQUARE, BELFAST.

Members.

Any Changes in the Addresses of Members should be at once notified to the Secretaries by Post Card.

- | | |
|--|---|
| <p>Adams, John J., M.D., Ashville, Antrim.
 Adams, John, The Manse, Antrim
 Adams, John, New King Street
 Alderdice, David, Craigfernie Terrace, Lisburn Road.
 Allen, Joseph, Solicitor, Lisburn.
 Allibon, George, 30 Donegall Place, Belfast.
 Allingham, Hugh, Ballyshannon.
 Allworthy, Edward, Mosaphir, Belfast.
 Anderson, John, J.P., East Hillbrook, Holywood.
 Anderson, Robert, Donegall Place.
 Anderson, John M., Marlborough Park.
 Anderson, James F., 39 Fitzwilliam Street.
 Andrew, J. J., L.D.S., Belgravia.
 Andrew, Rev. John, 25 Rugby Rd.
 Andrews, Miss M. K., 12 College Gardens.
 Andrews, Miss, 12 College Gardens.
 Ardill, Robert, 36 Lonsdale Street, Belfast.
 Atkinson, Rev. E. D., B.D., The Rectory, Waringstown.</p> <p>Bain, John, Royal Avenue, Belfast.
 Barkley, James M., Queen's Square.
 Barbour, John H., 1 Hamilton Villas, Ballyholme, Bangor.
 Barr, James, Beechleigh, Windsor Park.
 Barr, John, Glasgow Steam Boat Office, Queen's Square.
 Batt, William, Sorrento, Windsor, Belfast.
 Bell, E. George, Bellevue, Lurgan.
 Beattie, Rev. A. H., Portglenone, Co. Antrim.
 Beck, Miss Emma, Old Lodge Road.
 Beggs, D. C., Ballyclare.
 Bell, Robert, Charleville Street.
 Bell, Leonard, Braemar Terrace, Balmoral.</p> | <p>Bell, Miss Alice J., Braemar Terrace, Balmoral.
 Berry, Lieut. J. J., The Barracks, Dundalk.
 Best, James, Clarence Place.
 Bigger, Francis Joseph, Ardrie.
 Bingham, Edward, Ponsonby Av.
 Blackwood, W. B., University Sq.
 Blair, E., Glenburn Park, Cavehill Road.
 Blair, Mrs., Glenburn Park, Cavehill Road.
 Bland, Major General, Woodbank, Whiteabbey.
 Boyd, Miss, Chayo, Adelaide Park.
 Boyd, J. St. Clair, M.D., 27 Great Victoria Street.
 Boyd, Miss, Cultra House, Holywood
 Boyd, Miss Ethel, 43 Victoria Place.
 Boyd, Wm., 43 Gt. Victoria Street.
 Braddell, Edward, St. Ives, Malone Road.
 Brandon, Hugh B., Royal Avenue.
 Brown, Robert, B.A., Wingfield Lodge, Bloomfield.
 Breakey, Rev. J. P. R., M.A., The Rectory, Armoyle.
 Brennan, Rev. S. A., B.A., Knocknacarry.
 Brett, Chas. H., Gretton Villa South.
 Bristow, Rev. Canon, St. James' Parsonage.
 Brown, John, Longhurst, Dunmurry.
 Brown, Thomas, 102 Donegall St.
 Brown, Wm., 18 Chichester Street.
 Browne, W. J., M.A., 5 Crawford's Square, Derry.
 Bruce, Miss E., "The Farm."
 Bulla, Charles, Wellington Park Terrace
 Burnett, John R., Rostellan, Malone Road.
 Burtchaell, George D., M.A., 7 St. Stephen's Green, Dublin.</p> <p>Campbell, J. O., B.E., Ravenhill Road.</p> |
|--|---|

Campbell, Thomas James, Rathmore,
Co. Antrim.
Carson, J. C., 73 Victoria Street.
Carson, John, Walmer Terrace,
Holywood.
Carson, Robert, Reform Club, City.
Carrothers, Michael, 4 Stranmillis
Gardens.
Carruthers, Miss, 9 Claremont St.
Carter, W., Chichester Park.
Carter, W. Charles, 30 Donegall
Place.
Christie, Rev. W. J., 13 Cliftonville
Avenue.
Cleaver, John Martin, Dunraven,
Malone Road.
Clements, W. T., 1 Agincourt Ter-
race, Rugby Road.
Cleland, Jas. A., Wellington Park.
Cleland, W. W., 48 Wellington
Park.
Cleland, Mrs. Annie, 32 Lower
Easton Street, Cliftonville.
Cleland, Alex. M. J., 32 Lower
Easton Street, Cliftonville.
Coates, S. B., M.D., Shaftesbury
Square.
Coates, John D., 41 Chichester St.
Cochrane, Robert, M.R.I.A., 17
Highfield Road, Dublin.
Colbeck, James, Shaw's Bridge.
Cole, Rev. Richard, Armagh.
Coleman, J., H.M. Customs, South-
ampton.
Corley, Miss E., 52 Elmwood Av.
Corley, Miss Kate A., 52 Elmwood
Avenue.
Corry, W. F. C. S., Chatsworth,
Malone Road.
Cosgrove, Henry, 35 Rugby Road.
Costigan, Wm., Gt. Victoria Street.
Coulson, Gerald, 4 College Street
South.
Crymble, George G., Gordon House,
Annadale.
Culbert, Robert, Distillery Street.
Cunningham, Chas. M., 18 College
Square East.
Cunningham, Samuel, Glencairn,
Belfast.
Curley, Francis, High St., Belfast.
Curley, Mrs., Dunedin Ter., Belfast.
Coulter, Mrs., 21 University Square.

Cowan, P. C., c.e., 9 College
Gardens.
Crane, Thomas, 3 West Elmwood,
Lisburn Road.
Crawford, F. H., 20 Mill Street.
Creeth, James, Victoria Square.

Dalton, John P., 4 Roseberry Villas,
Chichester Park.
Darbishire, R. D., Victoria Park,
Manchester.
Damant, Mrs., Lammas, Cowes,
Isle of Wight.
Davis, Henry, Holywood.
Davies, John Henry, Glenmore
Cottage, Lisburn.
D'Evelyn, Alex. M., M.D., Bally-
mena.
Dickson, John M., Hillbrook, Holy-
wood.
Dickson, Wm. W., 52 Pakenham
Place.
Dixon, W. H., Dunowen.
Donaldson, George, Box 202, Adams
Mass., U.S.A.
Donaldson, John, 18 Brookhill Av.
Donnon, W. D., M.B., Ardmore
Terrace, Holywood.
Duffin, Miss, Strandtown Lodge.
Dufferin and Ava, Marquis of,
Clandeboyne.
Dunlop, Fleet Surgeon, Belvidere
Cottage, Lisburn.

Elliott, David, Cyprus Park, Bloom-
field.
Elliott, George H., Holywood.
Ewart, L. M., J.P., Glenbank.
Ewart, Clement C., Glenbank.
Ewart, Ernest, Glenbank.
Ewart, William, Glenmachan.
Ewart, Sir Wm. Q., Bart., Glen-
machan.
Ewart, L. M. Algernon, Glenbank.

Faren, W., 11 Mountcharles.
Feunell, W. J., M.R.I.A., Chichester
Street.
Ferguson, G. W., Donegall Park.
Ferguson, Henry, Donegall Park.
Ferguson, James H., 2 Wellesley
Avenue.
Firth, Joseph, Whiterock.

Firth, William A., 92 Cliftonpark Avenue.

Foster, T. W., M.A., 1 Clonsilla, Antrim road.

Foster, Rev. G., Lurgan, Co. Armagh.

Fraser, R. N., 271 Albertbridge Road.

Frame, John, 6 Lawrence Street.

Fullerton, Geo., Croagbeg, Bushmills.

Fulton, David, Arlington, Windsor Avenue.

Galway, J. C., Wynstay, Rosetta Park.

Galloway, Peter, University Street.

Gailey, T. A., 10 Ardenvohr Terrace, Woodstock Road.

Galloway, Joseph, 83 Eglantine Avenue.

Galway, William H., 3 Dufferin Buildings, Bangor.

Gamble, Miss, Royal Terrace.

Gibson, William, Heathfield House, Ballygowan, Co. Down.

Gibson, Henry, Glencairn.

Gibson, Sergeant, Brown's Square Barracks.

Gibson, Andrew, 14 Cliftonville Avenue.

Gibson, William, 30 Castlereagh Place.

Gilmore, W. J., 9 Cavehill Road.

Gilmore, George, Mountcharles, Belfast.

Glenn, George J., Hartington Street.

Godwin, Wm., Queen Street.

Gourley, James, J.P., Derryboy Cottage, Crossgar.

Graham, Wm., Lombard Street.

Gray, Wm., M.R.I.A., Glenburn Park, Cavehill Road.

Green, Mrs. Isaac, Hawthornden, Knock.

Greenfield, Chas., Marino, Holywood.

Greene, John J. F., J.P., Annavilla, Warrenpoint.

Greer, Mrs., Dulce-Domum, Strandtown.

Green, Wm. A., c/o Forster Green & Co., High Street.

Gregg, Miss, Glenbrook, Castlereagh, Co. Down.

Gulbransen, P. F., 17 Queen's Arcade.

Gulbransen, A., 17 Queen's Arcade.

Hamilton, Alec., 4 Richmond Crescent.

Hamilton, John, 5 Church Avenue, Holywood.

Hazlett, Miss Winnie, College Gardens.

Hanna, Richard, Charleville Street, City.

Hanna, Wm., M.A., M.B., Lisanore Villa, Antrim Road.

Hanna, Henry, A.B., Farrington, Antrim Road.

Hanna, Miss Margaret J., 3 Hopefield Terrace, Antrim Road.

Harbison, Mann, Ravenhill Terrace.

Hardy, Gardner, 5 Wellington Park.

Harkness, Miss Lizzie, Coil-Mara, Cultra.

Haslett, Sir Jas. H., J.P., Princess Gardens.

Hazelton, W. D., 35 Linenhall Street.

Hazelton, Wm., Agathona, Bloomfield.

Herdman, A. T., 36 Wellington Park.

Heron, F. A., Cultra, Holywood.

Heritage, Miss, Wolsley Villa, Bloomfield.

Hill-Littler, Robert, Tareen, Chichester Park.

Hobson, Benjamin, 6 Hopefield Avenue.

Hogg, A. R., 73 Victoria Street.

Holden, J. S., M.B., Sudbury, Suffolk, England (Cor. Mem.).

Holland, Wm., Osborne Park.

Hoskins, A. P., 25 Blenheim Terrace, Cromwell Road.

Houston, Fred H., Granville Gardens.

Inglis, William, Riverston Terrace, Holywood.

Jackson, A. T., 5 Corn Market.

Jaffe, Mrs. Otto, Kinedar, Strandtown.

Johnson, W. S., Knockbreda Park.

- Johnstone, Miss, Glenavy, Lurgan.
 Johnston, W. J., J.P., Dunesk, Stranmillis.
 Johnston, Miss E., Dunesk, Stranmillis.
 Johnston, James, 19 Waring Street.
 Johnston, Miss A., Lisnaveane, Donegall Park, Antrim Road.
 Jones, Prof. T. R., F.R.S., 17 Parson's Green, Fulham, London, S.W.
- Keay, David, 22 College Green, Belfast.
 Keith, Samuel F., 7 Glenravel St
 Kelly, Wm. R., C.E., Dalriada, Malone Park.
 Kennedy, R. M., 41 Waring Street.
 Kidd, George, Lisnatores, Dunmurry.
 Kilpatrick, W. J., Donegall Place.
 Kennedy, F. J., 4 Clarence Place.
 Kirker, S. K., Offices of Board of Public Works, Belfast.
 Kirkpatrick, F., 78 Ann Street.
 Kirkwood, J. A., Dundonald.
 Kinahan, John, Lowood, Belfast.
 Knight, Charles J., 29 Fleetwood Street.
 Knowles, W. J., M.R.I.A., Ballymena.
 Knowles, Miss M., Flixton Place, Ballymena.
 Kyle, R. A., 31 Donegall Place.
- Lamb, Wm. W., 34 Brookvale Avenue.
 Lamb, Miss, Divis View, Lisburn Road.
 Lanyon, Chas. J., Castleton Terrace, Antrim Road.
 Lawther, Stanley, Mount Vernon, Belfast.
 Lapworth, Professor Charles, Mason College, Birmingham.
 Lepper, F. R., Elsinore, Crawfordsburn.
 Leslie, James, Eglantine Avenue.
 Leslie, Mrs., Eglantine Avenue.
 Lett, Rev. H. W., M.A., Aghaderg Glebe, Loughbrickland.
 Letts, Professor E. A., Dunavon, Craigavad.
- Lewers, Hugh, M.D., 257 Shankhill Road.
 Lewis, Joseph, 13 Pakenham Street.
 Lockwood, F. W., 2 Brookhill Avenue.
 Lodge, Chas. W., 26 Royal Avenue.
 Logan, Mrs., Bangor, Co. Down.
 Lowry, D. E., 25 Donegall Place.
 Lyttle, Rev. R., The Mause, Moneyrea, Comber.
- MacCormac, Dr. John, Gt. Victoria Street.
 MacDonald, Wm., Carlisle Circus.
 MacDonnell, Dr. D., 17 Crumlin Road.
 MacElheran, W. F., 3 College Gardens.
 Mackenzie, John, Malone, Belfast.
 MacKinnon, Mrs., Coleraine.
 MacLorinan, Chas., LL.D., Donegall Street.
 Maconachie, Rev. Jas., 4 Cliftonville Avenue.
 Macoun, W. Godfrey, 8 Claremont Terrace, Belfast.
 Macrory, Mrs., Eia, Antrim Road.
 Major, Rev. J. J., 13 The Mount, Mountpottinger.
 Malcomson, Greer, Malone Park.
 Malcomson, Jas., Cairnburn, Strandtown.
 Mann, Jas. S., Ballyholme, Bangor, Co. Down.
 Marsh, Mrs., Glenlyon, Holywood.
 Marsh, Joseph C., 2 Chichester Gardens.
 Marshall, H., Edlingham Terrace, Duncairn Gardens.
 Martin, Adam, 31 Stanmillis Road.
 Martin, J. McClelland, Northern Counties Railway.
 Mathewson, Mrs., Helen's Bay.
 Maxton, James, Ulster Street.
 May, Robert, Lothair Avenue.
 Millen, Saml. S., B.A., 44 Ulster-ville Avenue.
 Milling, A. M. Miss, Woolsey, Villas, Malone Park.
 Milligan, A., 3 Hartington Street.
 Milligan, S. F., M.R.I.A., Alberta, Malone Road.
 Mollan, W. S., 10 Brunswick Street.

Mollan, Miss, Hope House, College Park.
 Montgomery, R. M., 22 Corporation Street.
 Moore, John, Shaftesbury Square.
 Moore, Dr. J. B., 4 Mountpottinger Road,
 Moore, Wm., 5 Ardenvoehr Terrace.
 Moore, Miss, Corunna House, Ballynafeigh.
 Moore, James, Corunna House, Ballynafeigh.
 Moore, S. A., 2 Howard Street.
 Moore, Samuel, 1 Clifton Terrace.
 Morrow, David, Church Hill, Holywood.
 Morton, John, Cliftonpark Avenue.
 Moss, Wm., 6 Princess May Grdens, Antrim Road.
 Murdoch, James, 10 Ponsonby Av.
 Munce, W. B., Rosemary Street.

M'Afee, George, Walmer Terrace, Holywood.
 M'Alery, J. M., 21 Royal Avenue.
 M'Alister, Thos., 2 Rosetta Gardens, Ormeau Road.
 M'Cance, J. S., Dunmurry.
 M'Candless, Wm., 3 Finvoy Terrace, Fitzroy Avenue.
 M'Chesney, Jos., Holywood.
 M'Clean, F. P., Huntley Villas, Belfast.
 M'Cleery, H., 82 Cliftonpark Av.
 M'Cleery, Wm. H., 22 Landscape Terrace.
 M'Connell, James, Annadale Hall, Ballynafeigh.
 M'Connell, Miss, Annadale Hall, Ballynafeigh.
 M'Cormick, H. M'Neile, Craigavad.
 M'Cormick, John, The Hermitage, Bloomfield.
 M'Creery, James, 257 Albertbridge Road, Belfast.
 M'Cullough, John, Martello, Holywood.
 M'Cullough, J. C., Holywood.
 M'Cullough, Wm., Belfast Bank, Newtownards.
 M'Cutcheon, Miss, B.A., Terraquin, Balmoral Avenue.

M'Dermott, Rev. John, Belmont, Belfast.
 M'Gaw, Miss, 17 Wellington Park Terrace.
 M'Illroy, J. Milford, 47 Atlantic Avenue, Belfast.
 MacIlwaine, J. H., Ravensdale, Strandtown.
 MacIlwaine, Mrs., Ravensdale, Strandtown.
 M'Kee, John, Solicitor, Prince's Chambers, Ann Street.
 M'Kee, Robert, M.A., Harlesden College, Bramshill Rd., London, N.W.
 M'Kee, Wm. S., 20 Mill Street.
 M'Kenzie, Dr. W. G., Gt. Victoria Street.
 M'Kinney, W. F., Ballyvesey, Carnmoney.
 M'Kisack, Alfred, Hope Street Factory.
 M'Kisack, C. J., 12 Mountcharles.
 M'Kisack, Dr. H. L., College Sq. East.
 M'Lean, Geo., 19 Pottinger Street.
 M'Leish, John, "The Mount," Mountpottinger.
 M'Mordie, David, 2 Belgravia Av., Belfast.
 M'Mordie, James, Belgravia Avenue, Belfast.
 Nicholson, H. J., 5 West Elmwood.
 Nesbitt, W. C., Kennaird Terrace,
 O'Neill, Henry, M.D., 6 College Square East.
 O'Neill, James, M.A., 5 College Square East.
 Orr, H. Lamont, Garfield Street.
 Olley, Robert, 69 University Av.
 Patterson, D. C., Clanbrassil Ter., Holywood.
 Patterson, R. L., jun., 31 Botanic Avenue.
 Patterson, Wm. H., jun., Clanbrassil Terrace, Holywood.
 Patterson, Richard, J.P., Kilmore, Holywood.
 Patterson, Miss Clara, Kilmore, Holywood.

- Patterson, Robert. M.B.O.U., Tile-cote, Malone Park.
- Patterson, Wm. H., M.R.I.A., 'Garranard, Strandtown.
- Patterson, S. R., 1 Lombard Street.
- Patterson, Miss F., 6 College Gardens.
- Patterson, E. F., jun., 6 College Gardens.
- Paul, Rev. John, Kimberly Gardens, Bloomfield.
- Paul, Thomas, Redcot, The Knock.
- Payne, J. C. C., J.P., Oxford Buildings.
- Perry, T. G., Lisburn Road.
- Phillips, Wm. H., Lemonfield, Holywood.
- Phillips, Jas. J., 61 Royal Avenue.
- Phillips, Jas. St. J., B.E., Royal Avenue.
- Pim, John, J.P., Bonaven, Antrim Road.
- Pim, Thos. W., 21 Victoria Street.
- Pim, Joshua, Slieve-na-failthe, Whiteabbey.
- Pooler, Rev. C. K., Carnmoney.
- Polley, W. T., 52 Fitzroy Avenue.
- Porter, J. A., Queen's Square, City.
- Porter, Wm., Beechview, Balmoral Avenue.
- Porter, Miss Mary, 148 Albion Place.
- Praeger, E. A., Holywood.
- Praeger, R. I.L., M.R.I.A., National Library, Kildare St., Dublin.
- Purdon, Mrs., 5 Wellington Place.
- Purdon, Dr. Richard, Murray's Terrace.
- Quail, Rev. Patrick, Dunmore, Ballynahinch.
- Rea, Miss, Churchfield, Holywood.
- Redmond, David, Antrim.
- Reid, Robert, King Street, Belfast.
- Renold, August, Ullswater Terrace, Cavehill road.
- Ritchie, James, c/o Millar, Boyd, & Reid, Calendar Street.
- Robertson, J. C., Methodist College, Belfast.
- Robinson, W. H., 29 Spencer Street.
- Robinson, Saml., Helen's Bay, Co. Down.
- Ross, Wm. A., Iva Craig, Craigavad.
- Rowley, Wm. M., 22 Rosemary Street.
- Russell, John, C.E., Waring Street.
- Scott, Conway, C.E., Windsor Av.
- Shanks, James, Ballyfounder, Portaferry.
- Scott, Rev. Oswald, A.M., 1 Hampden Terrace, Rugby Road, Belfast.
- Sharpe, Robert, 100 Fitzroy Avenue.
- Shaw, Cecil, M.D., 14 College Sq. East.
- Shaw, Wm. Hinde, Brooklyn, Knock.
- Shaw, Lancelot, Brooklyn, Knock.
- Shaw, Mrs., Brooklyn, Knock.
- Shepherd, Percy, N. C. Railway.
- Sheldon, Charles, M.A., Belfast Royal Academical Institution.
- Skillen, Joseph, Ballee, Ballymena.
- Silly, George, Ardene, Sydenham.
- Sinclair, F. Howard, M.D., Pakenham Place.
- Sinclair, Miss, Hopefield, Belfast.
- Sinclair, Miss Nan., Hopefield, Belfast.
- Slater, William, National School, Strandtown.
- Small, Hugh, Sullivan School, Holywood.
- Smith, Rev. W. S., The Manse, Antrim.
- Smith, Dr. Lorraine, 33 Stranmillis Road, Belfast.
- Smyth, Walter, Woodview, Holywood.
- Smith, J. K., 23 Rugby Road, Belfast.
- Smyth, Sydney B., M.D., Great Victoria Street.
- Smith, G., Linenhall Library.
- Smythe, Ven. Archdeacon, Coole Glebe, Carnmoney.
- Smythe, Mrs. Proctor, 50 Duncairn Street.
- Somerset, Robert, 25 Cavendish Street.
- Speers, Adam, B.Sc., Up. Sullivan School, Holywood.
- Staples, Sir N. A., Bart., Lissan, Dungannon.
- Steele, Miss, 45 University Street.
- Stears, Samuel, 79 Ormeau Road.
- Stephens, Samuel, Martello Terrace, Holywood.

- Stelfox, James, C.E., Oakleigh,
Ormeau Road.
- Stephens, Mrs., Whitehead, Co.
Antrim.
- Stevenson, John, Coolavin, Malone
Road.
- Stevenson, J. M'N., Carrickfergus.
- Stewart, Rev. J. A., Pond Park,
Lisburn.
- Stewart, S. A., The Museum,
Belfast.
- Stewart, W. J., 31 Adelaide Street.
- Strain, David, Carlisle Circus (Ulster
Bank).
- Swanston, Wm., F.G.S., 18 Clifton-
ville avenue.
- Swanston, Mrs., 18 Cliftonville Av.
- Symington, Saml., Ballyoran, Dun-
donald.
- Symington, Professor, F.R.S.E.,
Queen's College.
- Tate, Alexander, C.E., Rantallard,
Whitehouse, Belfast.
- Taylor, E. E., Garfield Chambers,
City.
- Thomas, S. G., Limestone Road.
- Thompson, Miss S. M., Macedon,
Belfast.
- Thompson, Mrs. H., 14 Upper
Crescent, University Road.
- Thompson, Rev. David, Dromore,
Co. Down.
- Thompson, Prof. W. H., Queen's
College, Belfast.
- Todd, John, Clarinda, Fortwilliam
Park.
- Todd, C. H., Wolsley Villa, Bloom-
field.
- Todd, Wm. A., 24 Victoria Street.
- Traill, W. A., Bushmills.
- Tulloch, Miss, Howard Street.
- Turner, James, 10 Richmond Square.
- Turtle, Jas. C., Claremont, Strand-
town.
- Vint, Joseph H., Ulster Bank,
Donegall Place.
- Vinycomb, John, M.R.I.A., Holy-
wood.
- Vinycomb, T. Bernard, Riverview,
Holywood.
- Waddell, Rev. C. H., M.A., B.D.,
The Vicarage, Saintfield.
- Wakeman, W. J., F.R.S.A., Knights-
ville, Blackrock, Dublin.
- Walker, Thos. R., Rugby Road.
- Walker, W. J. D., Lawrencetown,
Co. Down.
- Walker, Mrs., Lawrencetown, Co.
Down.
- Walkington, Miss, LL.D., Strand-
town.
- Walkington, T. R., Edenvale,
Strandtown.
- Walsh, Robert, Abbotsford, Malone
Road.
- Walmsley, Rev. Douglas, B.A.,
Redburn, Adelaide Park.
- Ward, T., Eden Crescent, Antrim
Road.
- Ward, Phillip, 12 St. Paul's Terrace,
City.
- Wardell, Miss, 63 Botanic View,
University, Road.
- Watson, Thomas, Shipquay Gate,
Londonderry.
- Waugh, Isaac, Wilmont Terrace,
Lisburn Road.
- Welch, R. J., 49 Lonsdale Street.
- Wheeler, Mrs., Lennoxvale, Belfast.
- Whitla, Professor, M.D., College
Square North.
- Wilson, James, C.E., Oldforge,
Dunmurry.
- Wilson, James, Ballybundon, Kil-
linchy.
- Wilson, Alec. G., Stranmillis.
- Wilson, W. H., Stranmillis.
- Wilson, Jas. F. D., 82 Joy Street.
- Wilson, Geo., 3 Cliftonville Avenue.
- Wilson, Thomas, C.E., Fleetwood
Street.
- Wise, B. D., Waterside, Greenisland.
- Woolcombe, Dr. Robert LL., LL.D.,
M.R.I.A., 14 Waterloo Road,
Dublin.
- Woodward, Mrs., The Vicarage,
Ligoniel.
- Workman, Rev. R., M.A., Rubane,
Glastry.
- Workman, Thos., J.P., Helen's Bay.
- Wright, Joseph, F.G.S., Alfred St.
- Wright, Miss, Alfred Street.
- Wylie, William, 8 Mountpleasant.
- Young, Robert, J.P., C.B., Rath-
varna, Chichester Park.

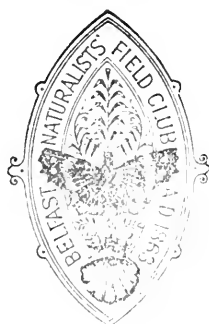
ANNUAL REPORT AND PROCEEDINGS
OF THE
BELFAST
NATURALISTS'
FIELD CLUB

For the Year ending the 31st March, 1898.

(THIRTY-FIFTH YEAR.)

SERIES II.

VOLUME IV.



PART V.

1897-8.

Belfast :

PRINTED FOR THE CLUB.

BY ALEXANDER MAYNE & BOYD, 2 CORPORATION STREET,
PRINTERS TO QUEEN'S COLLEGE, BELFAST.

1898.

REPORT.

THE Committee of the Belfast Naturalists' Field Club now bring before the Members their Thirty-fifth Annual Report.

The routine of Summer Excursions and Winter Meetings was gone through as usual, but your Committee would desire to see more active interest taken by the Members in work of the Field Club. That there are yet wide fields of discovery awaiting the labours of investigators is shown by the recently published work of Dr. Hume on the Cretaceous Rocks of Antrim. In this work the valuable assistance received from some of your members is duly acknowledged. One of your members Mr. H. Hanna, B.Sc., M.A., has added a new species of Polychaete to the British Fauna by his researches at Murlough Bay, and some other results require further investigation. Special notice has been made of the contributions from some of your members to the Geological Collection of photographs made by the British Association. The photos already acknowledged were contributed by a few of our geological members. There are many others, who, no doubt, could also help, and it would be well if they would communicate with the Secretaries. Also, through the efforts of the Club, the old Town Cross of Downpatrick has been got together, and re-erected on a suitable site at the East end of the Cathedral.

During the past summer the following excursions were made :—

Downpatrick, ..	..	..	..	22 May
Arboe, ..	..	..	..	12 June.
Island Magee, ..	..	..	..	26 June.
North Coast of Antrim, ..	..	..	..	2, 3, 4, 5 July.

Sallagh Braes,	..	..	..	15 July,
Cranfield Point	..	..	..	31 July.
Newry,	..	..	..	14 August.
Crow Glen, ..	..	..	..	4 September.

The winter meetings were as follows :—

Nov., 1897, Social Meeting.

16 Dec., „ A Cruise Round the Irish Coast, by S. K. Kirker, M.R.I.A.

18 Jan., 1898. Notes on the Fauna of Antrim, by H. Hanna, B.Sc., M.A.

„ „ Fairies and Their Dwelling Places, by Miss Andrews.

„ „ Land Shell Pockets—Ancient and Modern, by R. Welch.

15 Feb., „ Mosses and Liverworts, by Rev. C. H. Waddell, B.D.

15 Mar., „ The Anthropological Importance of the Antiquarian
Remains in Antrim and Down, by Wm. Gray, M.R.I.A.

19th April, „ Annual Meeting.

Special facilities and assistance were given to those desirous of prosecuting particular studies by the Botanical and Geological Sections—the reports of which will be found under their proper headings in the report of the Annual Meeting.

The following is the Report of Sub-Committee appointed to examine collections sent in for prizes :—

Only one collection has been received in competition for the prizes offered by the Club this year.

This was a collection of fossil sponges by Robert Bell, exhibiting great diligence and care in the naming of the specimens. Whilst we regret that a few were unnamed, we have pleasure in recommending that the prize be awarded to him.

WM. GRAY,
JOS. WRIGHT,
S. A. STEWART,
J. ST. J. PHILLIPS.

Your Committee would remind members that the Subscriptions to the Club are due at the beginning of the Session, and prompt payment would facilitate the working of the Club. A considerable number of Subscriptions due for this past year are still in arrears.

Again the Club have to thank the Railway Companies for facilities of travel, the Press for their lengthened reports of the

Club's proceedings, the members who have made communications to the Club during the winter Session, and the kind friends from whom the Club received hospitality on the occasions of summer excursions.

FRANCIS JOSEPH BIGGER,
JAS. ST. J. PHILLIPS,

Hon. Secs.

THE TREASURER IN ACCOUNT WITH THE BELFAST NATURALISTS' FIELD CLUB.

Dr. Income and Expenditure for the Year ending March 31, 1898. Cr.

*To Subscriptions	..	..	£70	0	0	By Balance from last Account	..	..	£11	7	10
" Entrance Fees	..	..	4	0	0	" Printing Proceedings	..	..	18	7	0
" Proportional Share of Social Meeting	..	..	5	0	0	" Stationery, Printing, &c.	..	..	16	1	0
" Balance of Excursion Account	..	..	5	16	9	" Rent of Museum	..	..	11	6	0
" Sales of Flora	..	..	2	3	4	" Botanical Section	..	..	1	0	0
" Sales of Proceedings	..	..	0	10	0	" Commission to Collector	..	..	2	19	11
" Sales of Lists	..	..	0	6	0	" Donation to <i>Irish Naturalist</i>	..	..	2	0	0
" Balance due Treasurer	..	..	2	5	9	" Donation to Irish Field Club Union	..	..	2	2	0
						" Expenses of Lectures, Lantern, &c.	..	..	2	2	3
						" Postages	..	..	19	0	3
						" Insurance	..	..	1	4	6
						" Gas	..	..	1	17	5
						" Incidentals	..	..	0	13	8
									£90	1	10

* About £40 of Subscriptions for this year are still unpaid,
vide Annual Report.

W. H. PHILLIPS, *Treasurer.*

PROCEEDINGS.

SUMMER PROGRAMME.

EXCURSIONS.

22 May.

DOWNPATRICK AND INCH ABBEY.

The first excursion of the summer season was made by a large party on Saturday, 22 May, to Downpatrick, Saul, and Inch Abbey. On arrival at Downpatrick the party proceeded to the wells at Struell, still visited on the first Sunday after Midsummer Day. The photographers, who were in great numbers, here began operations, which were steadily continued throughout the day. A large number of pictures of Archæological subjects was secured. The Secretaries announced that a prize would be offered for the best collection of flowering plants made during the day, and this prize was subsequently awarded to John Adams for seventy-two specimens, including the beautiful purple *Erinus alpinus* growing high on the gaol walls. Saul was next visited. Here it was that St. Patrick is said to have founded his first church. Three stones with ancient crosses are still seen in the old graveyard, the one built into the angle of the wall at the entrance gate being the finest. On the road to the Quoile, the scenery was much admired. In the distance were the outlines of the Mourne and the mountains near Ballynahinch rising above the summer haze, and forming

a well-broken skyline ; nearer at hand the hill Slieve-na-Griddle was bright with the bloom of broom and gorse. The shores of the Quoile River were soon reached. This river takes its name from the woods along its banks, but future generations may be puzzled to account for the name if the tree-cutting which has been done in some places is carried further along the banks. Quoile Castle is one of the numerous square battlemented towers erected in this district by the followers of John De Courcy, who strove to Anglicise the country by the building of castles as well as abbeys. After examining this military work, the party spent some time at the Abbey of Inch, or, as it was called, Inis-de-Courcy. Time and the hand of man have dealt with this abbey, as they have done with so many of the architectural remains in this country, and left us but the outlines in some places of what has once been a glorious structure. One cannot but regret that more is not done when we think of the way such abbeys as Jedburgh and others in Scotland are kept and how pleasant it is to visit them. Such architectural remains as are still found are of interest, as they show the features and mouldings characteristic of the early English period. These were pointed out in the base of the transept arch, the corbel at the springing of the chancel arch, in the marks on the south wall of chancel, from which the moulded stone canopy of the sedilia has been torn away, and in many of the mouldings found scattered irregularly over the ground or buried beneath the *débris* that now covers the site of the nave. Of the conventual buildings which existed here in former times little now remains. The party then proceeded to the banks of the Quoile in search of plants, shells, and aquatic life. Some members crossed the river by boat, and walked over the great Dun of Celtair, with its encircling fosse and central fort, whilst others returned by road to Denvir's Hotel. After tea, three new members were proposed and elected, and the members spent an hour at the Cathedral before proceeding to the train for home, well satisfied, some with the historic places visited, others with the plants and specimens collected,

and all with the unsurpassed summer weather enjoyed during the day.

12 *June.*

ARBOE.

Only a small party assembled to take part in this excursion. On arrival at Toome Bridge, cars were mounted, and the party proceeded to Arboe Point where the fine ancient cross and old church were inspected. On the return drive the interesting eel fishery station was examined and some of the party secured diatomaceous earth for microscopic examination.

26 *June.*

PORTMUCK AND ISLANDMAGEE.

The third excursion of the summer season was to Portmuck and Islandmagee and as this was a half-holiday excursion it was well attended. A start was made by the 2-15 train for Maghera-morne. The party proceeded by ferry to Millbay, and then walked across to Portmuck through the picturesque valleys of Islandmagee. Here the Secretary's whistle sounded, and a short description was given of the geology and its relationship to the scenery and topography of the district, attention being called to the stacks of basalt and caves that occur close at hand, in presence of which we vividly realise the efficiency of the seemingly insignificant forces that are ever at work sculpturing the face of our land. Some of the members proceeded over the headland in search of botanical specimens, of which this neighbourhood presents a great variety, whilst others went in search of fossils in the Greensand and Chloritic Chalk on the shores. As this is a good locality for fossils the industry of the members was well rewarded by many specimens of *Exogyra* and *Ventriculites*, whilst

the familiar *Belemnite* was found abundantly in the overlying white chalk. Although the day was too hazy for the photographer, much admiration was expressed for the scenery, which is bold and striking, and is but little known, although one of the most interesting in our neighbourhood. Striking inland through the lanes, the main road was taken for Brown's Bay, on the way to the Larne Harbour ferry. Later in the evening, Olderfleet Castle was visited before taking the 8-15 train for Belfast. A prize for the greatest number of species of wild plants in flower was secured by a lady member with 73 species.

2, 3, 4, and 5 July.

FIELD CLUB UNION.

COAST OF NORTH ANTRIM.

The associated societies held their annual excursion this season on the 2nd, 3rd, 4th, and 5th of July. On this occasion the members of the various Irish Field Clubs visited the north coast of Antrim, making Ballycastle the centre—a district which is full of interest to the Naturalist, and of which a good account appeared in the *Irish Naturalist*, July, 1897. On the 2nd July the members of the Dublin Club and others joined the Belfast Club at the Northern Counties Railway, and took train to Ballycastle. Arriving here, the party proceeded to the Antrim Arms Hotel, which was made the headquarters during their stay. After early luncheon the start was made to visit and explore the sands of White Park Bay and the neighbourhood around Ballintoy. From the new road, which was the route selected, one gets a good idea of the geography and general character of the country. As the summit of the road was reached the extensive panorama of the district opens out. To the north the white cliffs of Rathlin Island were seen; to the east, far in the background, lay the Mull of Cantyre, with Fair Head as a middle distance, whilst in the foreground Bally-

castle and the shores of its bay were bathed in sunshine ; to the south and west the peat bogs, white with bog cotton, and on the sloping hills the well-tilled farms ; whilst Knocklayd rose with its basalt-covered dome, high above the whole district. At White Park Bay a halt was called, when the party soon scattered over the sand dunes in search of worked flints and pottery. The late storm had cleared the sand from many of the likely sites, and soon a fair number of finds were made, including some pieces of pottery with rude sunk ornament, whilst pockets in the sand yielded good results to the conchologist. The botanists found the beautiful meadow cranesbill or flower of Dunluce in brilliant bloom throughout the day. The Lias beds which occur in the bed of the stream at the east end of the bay were not well exposed in situ, as much weathering and slipping appeared to have taken place, but blocks of the lias which were found yielded numerous and characteristic fossils. Proceeding by the shore the scenery became more rugged and the geology of more interest. Here the sea stacks and tunnels in the rock were observed, whilst the beds of bole and lithomarge showed as brilliant bands in the dark rock. Passing Ballintoy Harbour and the quaint old windswept church, the village was reached, where afternoon tea was served. The party then proceeded past the quarry of dolerite to Carrick-a-Raide, where the volcanic neck and the characteristic beds of ash, with included fragments of basalt, were observed. After this the road was taken for Ballycastle, but occasional halts were made at likely botanical localities, and also to see the very beautiful example of fine grained and columnar basalt on the roadside near Glenstaghy. After dinner some of the members proceeded to the woods in search of moths, spending several hours wandering about amongst the trees with a lantern examining different plants and the sugar-smeared trunks of trees. The programme for the second day took the party to Fair Head and Murlough. A start was made shortly after nine o'clock along the shore road to the sandstones and shales with coal seams near Colliery Bay. Judging from the extent of the shafts

found some time ago, these seams were worked extensively in early times, but latterly they have been altogether neglected. There is now another start being made to open these mines, and the party found a steam-engine and pump in full work clearing the shaft of the mine not far from Bath Lodge preparatory to further work. At many sections of the shales fossils were found, chiefly *Stigmaria ficoides*, *Sphenopteris*, and *Sigillaria*, their mode of occurrence noted, and the age of the rocks explained. On reaching Carrickmore the ascent of Fair Head was made and extensive views obtained from the summit. Passing Lough-na-Cranagh, the Grey Man's Path was approached, and near this the immense and almost completely detached columns of basalt were observed, whilst a fissure was noted which gives promise of a change in the scenery at some future time, when the overhanging rocks of this headland will go to increase the enormous talus of blocks already formed at the foot of the cliffs. Whilst these general features were being observed some of the naturalists noted the occurrence of the peregrine and of hooded crows which were frequent all along the coast. Soon the wooded slopes of Murlough Bay came into view, and the botanists on the descent collected specimens of the Rose-root, Welsh poppy, and narrow leaved Willow-herb. On reaching the shore lunch was served at Miss Clark's cottage, after which the members broke up into parties to go in search of specimens, and to explore the woods, which form a good collecting ground for zoologists and botanists. A shower of rain had brought out a large number of the commoner species of Land shells, which were collected in abundance, whilst *Helix arbustorum* was found on the grassy slopes under the chalk cliffs. Further round the coast a few specimens of type and variety *cincta* were noted. *Helix rotundata* var *alba* was seen with a thin, fragile variety of *H. Nemoralis* on the headlands to the east. Here the rare *Helix jusca* was also found among the woodrush on the wet glen slopes with *Hyalunia nitidula* var *Helmii* and *Pupa anglica*. The botanists collected the yellow saxifrage, brittle bladder fern,

mossy saxifrage, and Bree's fern. The land planarian (*Rhynchodemus terrestris*), also occurred here as well as in other localities. In fresh water *Polycelis cornuta* was very widely distributed, occurring right down to the shore, although on the Continent this species frequents high altitudes. Other planarians not yet identified were collected. Some of the geologists went round Rue Bane Point and the stiff climb was well repaid by the view of some splendid dykes and sills of diorite, which are here seen about six feet thick, with fragments of embedded crystalline schists on their margins. On the return near the slopes of Murlough a visit was paid to the interesting conglomerate at the base of the chalk, and overlying the brilliant red beds of sandstone. On reaching the road again cars were taken for Ballycastle, and fine views obtained of the gravels and well-marked terraces of the Carey River. After a late dinner an exhibition of bat hunting was given by some members, which caused much amusement to the natives of Ballycastle, and resulted in the capture of *Vesperugo pipistrellus*. Later in the evening a conversazione was held, when the members made a display of and explained their various finds, and a very beautiful collection of land shells obtained in the neighbourhood were exhibited by Mr. Standen, of Manchester. Sunday was an open day and members made their own arrangements. Good weather and sunshine favoured the party all through, but on Monday the weather looked less favourable, and there were some showers. However, all the members turned out at the sound of the whistle, and a start was made for the valley of Glenshesk. The road to the bridge was taken, here the party dismounted, and were soon in pursuit of various objects, a few to visit the micaceous schists in the bed of the stream. The damp state of the ground prevented most of the members from attempting the ascent of Knocklavd, which all through the morning had been capped with cloud and mist, so attention was concentrated on the ravines and burns on the eastern slopes of the mountain, which yielded, as usual, some good species. The fresh water limpet (*Ancylus fluviatilis*) was noted to be unusually large and fine at

Glenbank. Under one of the bridges the nest of the dipper was found, and some of the members observed the bird in flight. Botanists collected the Moonwort, Staghorn Moss, Mountain Buckler fern, and Bree's fern. All again assembled at the hotel at four o'clock for dinner, after which, as this was the last day of the excursion, a few remarks were made by some of the senior members expressing the pleasure derived and the many advantages of combined excursions such as the present. The 6-15 train brought many of the members to Belfast, and others remained to return the next day by road or rail.

17 *July*.

SALLAGH BRAES.

At the suggestion of some of the botanists of the Club, who desired to see the Sallagh Braes at their best, the excursion, which was listed for 4 September, was changed to 17 July. Only a small party started however. The waterfall at Linn Bridge, at the junction of Chalk and Basalt, was visited. Most of the time was spent on Sallagh Braes botanizing, after which the party proceeded to Ballygalley Head on the return to Larne.

31 *July*.

CRANFIELD POINT.

The Club held an excursion on the 31 July to Cranfield Point, on the northern shores of Lough Neagh. A start was made for Randalstown in the 9-45 train. Arriving there, the route was taken to the shore of the lake, passing the old Oak Cross, only the shaft of which now remains. Here the party scattered along the shores of the lake, bent on different pursuits, traversing the rich carpet of harebells along the

margin of the lake. The botanists and geologists did fair work during the day. *Leonurus cardiaca*, a rare labiate plant, was found growing spontaneously in a hedge and field at Cranfield. *Potamogeton heterophyllus*, a rather rare pondweed, was found somewhat plentiful in the lough; and *Galium boreale*, one of the less common species of the bedstraw family, was abundant amongst the rocks on the shore. Here also grows *Hieracium auratum*, with *Rosa mollis*, *Circiæa alpina*, and several other plants of note. The shell collectors found the Marsh snail, *Limnæa palustris*, the Coil shell, *Planorbis Carinatus*, and the little freshwater limpet, *Ancylus fluviatilis*, was found in all stages of growth, covering the rocks along the shores of the lake, whilst a colony of the rarer *Limnæa stagnalis* flourished in a little pond at Rabbit Point. The beautiful albino variety of *Bythinia tentaculata* occurred in several places in flood material, quite fresh, though dead, with masses of the young shells of the Wandering snail, *Limnæa peregra*, and a few *Pisidium pusillum*. The old church at Cranfield Point may be said to occupy the "point" itself, as the graveyard in which it stands forms a small cape on the north-west end of Lough Neagh. The church is a small, rectangular ruin, measuring 42ft. 6in. by 21ft. 5in., the height of the site being about 10ft. 6in. on the inside, but nearly 3ft. less on the outside, owing to the gradual heightening of the graveyard. The formation of the west door seems to indicate a low step into the church. The door in the west gable retains its old stone dressings of a rudely-formed early English arch. There was formerly a chancel window, and a window in the north and south walls near the chancel end, but all their cut stone dressings have disappeared. The internal jambs show careful and even construction, the side ones having well defined circular splayed heads, which would indicate that the exterior arches were also circular. The chancel window has suffered very much and possesses little to guide one to any very accurate conclusions. Close beside the chancel window on each side, slightly lower than its sill, is a rudely-formed aumbry. The gable walls of the

east and west ends are in fairly good preservation—having received some attention from the Board of Works. The graveyard contains numerous headstones, chiefly dating from the middle of last century, and some of them are memorials to centenarians. It is bounded by a retaining wall towards the lough, whose waters no doubt once washed it. Close beside the graveyard is a Holy Well, closely covered by trees, which bear innumerable tokens of those who have prayed beside it or sought the efficacy of its waters.

14 *August.*

NEWRY.

A start was made from Belfast by the 8-10 train. On arrival at Newry a visit was made to the nursery at Daisy Hill, where Mr. Smith showed the members some rarities of plant life. Afterwards the party proceeded to Warrenpoint, where they were met by Mann Harbison, who subsequently acted as local guide and host. The quarries at Rostrevor were inspected on the way to Cloughmore. Some time was then spent in the demesne of the Honourable A. G. S. Canning, inspecting rare plants and a valuable and unique collection of foreign cattle and fowl. On returning to Rostrevor the members were entertained to tea by Mr. Mann Harbison, after which some members visited the old graveyard at Kilbroney to see the ancient cross, and grave of an "Irish Giant."

4 *September.*

CROW GLEN.

The seventh field meeting was held at Crow Glen. Though rain had fallen heavily during the few days before and on that morning, over a dozen members turned up, including several ladies. The route was by Ballygomartin Road,

thence to the lower slopes of Divis Mountain and to Crow Glen. Leaving the Ballygomartin road and striking upwards past Glencairn and Glendivis, the way was by the western branch of the Forth River. The botanists of the party descended to see a rare saxifrage which grows on the banks of the stream. This is *Saxifraga geum*, a plant of Western Europe, which is nowhere native in the British Isles, save in the extreme South-West of Ireland. On this spot on the Forth River, however, it grows spontaneously, and is said to have grown there for many years. Its origin is doubtless some garden in the vicinity, but if it holds its own in this locality it must ultimately be admitted to a place in our flora as a naturalised plant. Proceeding onward to the base of Divis the party struck off to the east, and in a few minutes reached the narrow rocky gorge of Crow Glen, known to botanists for its varied flora, and to local geologists for its fine section of the secondary rocks. The series displayed include the Keuper Marls, Lower Greensand, and Upper Chalk, capped with the eruptive basalt that usually crowns the hills of Antrim. A halt was made at a fine section of the yellow sandstone of the Hibernian greensand, and a search was made for specimens of its fossil fauna. Worm tubes of more than one species were found in the sandstone, and some indifferent molluscan remains, but nothing of special interest. The sterile stems of *Equisetum pratense* were recognised growing in the glen, this being one of our rarest horsetails. Further to the east the party were led to the ancient souterrain or artificial cave, which was previously visited by the Club some years since. It is much more accessible now, the accumulated rubbish having been to some extent cleared away, displaying the rough stone walls and roof of large stone slabs. Crow Glen is one of the stations for the rare landshells, *Helix arbustorum* and the beautiful little *Acme lineata* and its var. *alba*.

CONVERSAZIONE IN THE BELFAST FREE PUBLIC LIBRARY.

An interesting conversazione was held on the evening of the 10 Nov., in the Free Public Library buildings, the use of which was kindly granted by the Library Committee of the Belfast Corporation for that purpose. The meeting was under the combined auspices of the Belfast Naturalists' Field Club, the Belfast Art Society, and the Ulster Amateur Photographic Society. This was the first occasion on which these societies have joined in a conversazione, and the meeting proved a success in attracting a large gathering. The doors were opened to the members at 6-30. On entering, ample cloak-room accommodation was found in the Reading-room, which was in charge of the library officials. Tea was served in the room devoted to the Grainger collection and in the Lending Library. Some of the lady friends of each society acted as teamakers. Afterwards the members were directed to the exhibitions, which were well arranged in the Reference Library and Art galleries. On the tables of the Reference Library were laid out the exhibits by the Field Club, and these illustrated the work done or objects collected during the season by the members in the various branches of natural science and archæology. In the Microscopic Section the exhibitors were as follow :—Miss M. K. Andrews, rock sections and specimens of Mourne Mountain granite ; William Gray, botanical preparations, recent and fossil ; William Hanna, M.B., radiolaria and sponges ; W. S. M'Kee, freshwater organisms ; and Joseph Wright, F.G.S., foraminifera ; whilst the various organisms which give rise to typhoid and cholera were exhibited by Lorrain Smyth, M.D. ; W. D. Donnan, M.D. ; Cecil Shaw, M.D. ; and E. Coey Bigger, M.D. Geology was represented by exhibits by Miss S. M. Thompson ; H. J. Seymour, B.A., showed water-colour drawings of Benevenagh and Fair Head made by the late G. V. Du Noyer ; Robert Bell, zeolites from Squire's Hill and

Chalk fossils ; W. J. Fennell, fossil plant remains from Dunggannon ; J. St. J. Phillips, micro-slide preparation and the rock sectioning machine kindly presented to the Club by Messrs. Coombe, Barbour, & Coombe. In the botanical sections exhibits were made by Rev. C. H. Waddell of an educational series of plants and specimens collected by members of the Club during the past season. J. H. Davies exhibited Crane's bill, whilst F. W. Burbidge, F.L.S., exhibited azolla in fruit and odorous leaves from the Trinity College Gardens, Dublin. One of the most interesting exhibits perhaps was the series of butterflies recently collected in the United States by G. Donaldson, a member of the B.N.F.C. This collection attracted much attention, both as to the beauty and the novel and careful method of mounting the specimens. J. Hamilton had an exhibit of living reptiles, which was much appreciated. R. J. Welch exhibited a large variety of Land and Freshwater shells taken in various parts of Ireland during the past year, whilst G. P. Farran, of the Dublin Club, exhibited a number of rare species recently collected in Westmeath and Sligo. A good exhibit of old Ulster candlesticks and rushlights was made by Robert May and F. J. Bigger, an ornamental wrought-iron candlestick from Annalong being much admired. The exhibits of the Art Society were on view in the Picture Gallery. In the corridor the Photographic Society made an exhibit of a large collection of prints sent in for the summer competitions. These showed great artistic refinement and technical skill on the part of the members.

16 December.

Before the Ordinary Meeting on this evening a few members of the Club met to present an address of congratulation to Joseph Wright, F.G.S. Telegrams of congratulation were received from the Dublin Naturalists' Field Club. The text of the address was as follows :—

"TO JOSEPH WRIGHT, ESQ., F.G.S."

"DEAR SIR,

"We, your fellow members of the Belfast Naturalists' Field Club, sincerely and earnestly desire to congratulate you upon the distinguished honor conferred on you by Her Majesty's Government in awarding you a grant of £150 from Her Majesty's Royal bounty, in recognition of the very valuable services you have rendered to science by your laborious and long continued original researches into the Palæontology of the Carboniferous, Liassic, Cretaceous, and Tertiary rocks of Ireland ; more especially your investigation into the Microzoa of the Secondary, Tertiary, and recent deposits.

This distinction is of the greatest satisfaction to your numerous scientific and private friends, and it emphasises the honour done you a short time ago by the Geological Society of London. This, the parent, and still the most distinguished geological society in the world, selected you, as a distinguished Irish geologist, to receive one of the highest recognitions of unaided service it is in the power of that society to bestow—namely, a grant from "The Jamison Barlow Fund," which was established for the advancement of geological science.

After a prolonged and very cordial companionship, in some cases extending for a period of over 30 years, we have had ample opportunities of observing your earnestness, perseverance, and zeal in the prosecution of your favourite scientific studies, and the readiness with which you have placed the results at the disposal of others.

We have profited by your teaching in the lecture room, and in the field, and we have always found you a careful and efficient guide, a ready helper in our difficulties, and a most generous, courteous, and amiable companion.

We, therefore, rejoice to learn of the distinguished position you have attained among the geologists of our times, and we earnestly hope you may be spared in health and vigour to continue your studies for many years to come, and still further

benefit the world of science by the results of your systematic researches."

The officers for the current year and some of the members subscribed their names at the foot of the address.

Wm. Gray, Wm. Swanston, Adam Speers, and others having spoken in support of the address, in his reply Mr. Wright said—

I feel it quite impossible to convey in words my feelings on the present occasion. Your most kind reception, as also your addresses expressive of your pleasure at the Treasury grant recently awarded to me for scientific research, is indeed most gratifying. I feel deeply indebted to Professor A. C. Haddon, F.L.S., who, I understand, took a most prominent and active part in the movement, as also to the many other kind friends who signed the memorial in my favour, and to whose influence was due my obtaining the grant. I also feel that many of the investigations I have been engaged at would not have been nearly so satisfactory or complete had it not been for the kind assistance of my fellow members in supplying me with material for examination, as also for their cordial co-operation in other matters connected with my work. To be recognised as having in the slightest degree advanced our knowledge of Irish natural history gives me the greatest pleasure, and that pleasure is enhanced by the fact that the President and so many of my fellow members and co-workers in the Club are joined in this recognition.

A CRUISE ROUND THE IRISH COAST

In connection with the Munster Meeting of the Royal Societies of Antiquaries from Galway Bay to Waterford Harbour.

By S. K. KIRKER, C.E., F.R.S.A.

In the course of his remarks the lecturer said the steamship *Caloric* was chartered and started from Belfast on Whit Monday, 7 June, direct for Galway Bay, where the cruise proper commenced. On Tuesday the steamer put into

Kilmurvy Bay, Aran, where the party landed to explore the mighty Dun Aenghus and the ruins in the largest island Aranmore. Passing through Gregory Sound and along the beautiful Clare coast, Scatterry was reached. The antiquarian remains on Scatterry were well described. These consist of a round tower 120 ft. in height, a cathedral, an oratory and four churches, a cashel and a holy well.

Next the interesting remains at Kilmalkedar, Catherdorgan, and Gallerus were visited. Gallerus is one of the most perfect of our oratories, a shapely little building of dry stone, said to have been built in the seventh century. Afterwards the buried city of Fahan was explored, passing on the way the ruined castle of Rahinan, which consists of a massive square keep, the lower story vaulted, with flights of stairs in the thickness of the walls. It stands inside a large and well preserved earthen fort with a fosse and lofty rampart in which a souterrain opens towards the south-west. At Fahan, on the side of the Eagle Mountain overlooking Ventry Bay, are a succession of cashels and beehive cells extending for a distance of about 3 miles. On Thursday a start was made for the Skelligs, two small islands lying about 13 miles west of Kerry. A monastery dedicated to St. Michael was founded on the larger island in very early times, an ancient tradition makes it the burial place of Ir, son of Milesius. A little cove ending in a vast and gloomy cavern forms the only landing place. The approach to the monastery is for about half way by a modern road cut out of the rock for an approach to the lighthouse, and thence up the old approach which is formed by rude steps of rough rock up the steep slope to a vaulted passage through which we reach the deserted little "city of God." The remains of the monastery consist of five beehive cells or cloughauns of dry stone in wonderful preservation, two oratories also of dry stone and somewhat similar to Gallerus but not so perfect, St. Michael's Church built partly dry and partly with mortar, several rude crosses, and three tiny cemeteries and a well. Staigue Fort was afterwards visited—a nearly circular cave built of schistose

slate, about 30 yards in internal diameter, the enclosing wall is in some parts 18 feet high.

Queenstown and Cork were then visited, and Cloyne with its fine round tower, returning by the beautifully wooded demesne of Longfields with its great Cromleach. At Lismore the party had the opportunity of seeing the Crozier and Book of Lismore.

The Lecture was illustrated by numerous original limelight views.

18 *January*.

On this evening three papers were read.

1. H. HANNA, M.A., B.SC.—“NOTES ON THE FAUNA OF THE ANTRIM COAST.”
2. MISS ANDREWS.—“FAIRIES AND THEIR DWELLING PLACES.”
3. R. WELCH.—“LAND SHELL POCKETS: ANCIENT AND MODERN.”

Mr. HANNA described the results of a visit to Ballycastle, made for the purpose of studying Turbellarian worms and other low forms of marine invertebrates.

Special attention was drawn to the *Rhabdo coela*, especially *Convoluta paradoxa*. This animal lives not like other animals, but like a green plant in pools exposed to the air and sun's rays, which are necessary to enable the green chlorophyl of the algæ now living in the animals, to form the carbo-hydrates upon which this form now lives exclusively. A remarkable thing about this form is that if we separate the alga from the animal the former is not able to live independently of the latter, This shows how close in some cases the animal kingdom is to the vegetable, and how materially dependent the one is on the other.

Fecampia erythrocephala was recorded for the first time in this country, and an outline of its life history was given.

In the mud at the bottom of rock pools at Murlough Bay a number of Polychaetae were found, four of which, belonging to the same genus and species, are probably new to the British fauna, which English authorities refer to as a species of *Arenicola bucci* of Rathke.

Reference was made to the irregular segmentation of a specimen of *Cirratulus cirratus*.

MISS ANDREWS recorded a few traditions gathered from the peasantry in County Down and other parts of Ireland. The belief is general that the fairies were at one time very numerous, but have now disappeared from many of their former haunts. They are said to be about the size of children, and according to some the colour of their hair is red.

Several stories were related of the intercourse of fairies with human beings, and it was mentioned that to cut down a fairy thorn or to injure the house of a fairy is regarded as certain to bring misfortune. The fairies are celebrated as good musicians. They ride on small horses, and the sound of their spinning is often heard at night in the peasants' cottages. They are said to live in the "coves of the forts"—coves or caves meaning underground passages, in other words souterrains.

Several souterrains in the neighbourhood of Castlewellsan were described, and it was mentioned that the building of the forts and souterrains is ascribed by the country people to the Danes. These Danes were not the mediæval Norsemen, but may probably be identified with the Tuatha de Danann, whose necromantic power is celebrated in Irish tales. The traditions in regard to Danes and fairies are very similar in different parts of Ireland. The Rev. J. B. Leslie, in speaking of the south, describes the fairies as a species of beings neither men nor angels nor ghosts.

The peasants believe the fairies to be fallen angels, and no doubt many of the tales relating to them have their origin in the mythology of a primitive people, but it was suggested that

in the legends connected with the raths and souterrains we have a reminiscence of a dwarf race. After giving Mann Harbinson's opinion that the souterrains "have been constructed by a diminutive race, probably allied to the modern Lapps," Miss Andrews referred to the views of Mr. D. MacRitchie, that the Fians, fairies, and Picts belonged to similar, if not identical dwarf races. The description of the men of Spy given by Dr. Monroe in "Pre-historic Problems" was compared with the picture of the "Wee, wee man" in the old ballad, and the conclusion was drawn that in the fairy legends we may see traces of a struggle between a primitive race of small men, whose gods may have been, like themselves, of diminutive stature, and their more civilised neighbours.

Mr. WELCH described those curious little "pockets" of small shells, many of them rare and local, which one may find collected together by the swirling action of the wind round the dunes which fringe the beautiful Whitepark Bay, so close to the Giant's Causeway, and so seldom visited by the tourists who crowd to the latter. He also described the larger "pockets" in the Portstewart dunes, which yielded a shell, *Hydrobia Jenkinsi* new to the Irish fauna lately, and other scarce species, including the Albino variety of *Vertigo pusilla*, first found by Mr. Standen, of Manchester, in a similar "pocket" at Portsalon. A curious mixture of land shells and sea sand on the low bluffs at Portsalon was next referred to, and the fact that these modern deposits may help to explain the manner in which much older ones were found. A large number of shells collected in the "pockets" were shown, including those whose sudden appearance on short, grassy swards, after rain, gives rise to a firm belief in some localities in "snail showers." *Helix virgata* on the short sward at Ballycastle, and *Helix acuta*, at Portrush, were instanced, as products of these showers, and regret expressed at the fact that the golfers' big feet, there, as in other places, were rapidly diminishing the "showers."

15 *February*, 1898.

MOSES AND LIVERWORTS.

By REV. C. H. WADDELL, B.D.

When the winter season comes, and flowers wither, and leaves fall, and the larger plants take their winter rest, Nature does not cease her operations but brings the Cryptogams upon the scene, a humbler race of organisms, mosses, lichens, and algæ. These flourish during the damp and cool season, and contribute much by their soberer but wonderfully varied and beautiful tints to the beauty of the winter landscape. Mosses, as a rule, fruit at this season, and Bryology has this advantage over the more popular study of flowering plants that it can be pursued during all seasons of the year. Mosses are also more easily preserved, and keep their colour better when dried than any other group of plants. The lecturer then gave an account of the life history of a moss, from the spore to the full grown plant. The flowers are as a rule small, and to be searched for with a pocket lens situated on the sides or ends of the stems, but in some species such as *Polytrichum* they are conspicuous objects forming little red caps on the tips of the stems. The moss flower does not produce seed or fruit, but when fertilised produces a new plant, from which is developed the seta, bearing on its top the capsule containing spores. This is called in popular language the fruit.

The alternation of generations, as it is called, forms a sharp mark of distinction between these and higher plants.

The dispersal of the spores is regulated by a beautiful contrivance called the peristome, a door consisting of a closely fitting fringe of teeth which opens or closes automatically according to the dryness or humidity of the atmosphere. No two peristomes are formed on the same pattern, and a variety of beautiful forms of these was thrown upon the screen. In this and other particulars mosses exhibited a marvellous variety of contrivance and adaptations in their structures, traces of the

Creator's handiwork. Such are the elaters found in the capsules of liverworts. These are minute spirally coiled springs which are let loose with an explosion when the capsule bursts, and by their coiling and uncoiling serve to scatter the spores.

The sphagna or bog-mosses are quite a distinct group, and to them is owing the growth of the peat in bogs. They are so constructed as to form a sponge which pumps up the moisture to the surface of the tussocks in which they grow. They possess no roots but rise or fall with the soft surface, and from the detritus beneath the peat is formed.

All these plants are cellular and do not possess vessels for which reason they cannot resist drought and maintain their rigidity like other plants. Their office is to soak up and retain moisture. In dry times they collapse and curl up, but unlike withered phanerogamic plants will revive again quickly when rain comes without being destroyed.

This faculty of reviving again when soaked is an advantage to the student as specimens may be laid aside after collecting for many months to be soaked out again and examined at leisure. It is strange that this interesting class of plants has been so much neglected in this country. The lecturer recommended as the best portable and thoroughly reliable book on the subject Dixon's Handbook of British Mosses, and Sir Edward Fry's shilling handbook as an introductory work.

A note was contributed by George McLean on fasciation in plants, describing the general characteristics of the abnormality, and notifying its common occurrence in cultivated plants, and those grown in ground which has been excessively manured, especially in the succulent shoots of asparagus, cabbage, lettuce, and the ash tree, also of its inheritance through seed as in the cauliflower. He showed specimens of fasciated orange lily stems, being an unusual case of occurrence of the abnormality in stems from the same root two years in succession; also gave a list of many plants recorded as having been observed with this monstrosity.

15 March.

THE ANTHROPOLOGICAL IMPORTANCE OF THE ANTIQUARIAN REMAINS IN ANTRIM AND DOWN.

By WILLIAM GRAY, M.R.I.A.

An abstract of this Lecture is reserved for future publication.

ANNUAL MEETING.

The Thirty-fifth Annual Meeting of the club was held in the Museum on 19th April to transact the usual business—William Gray, M.R.I.A. in the chair.

The Secretary read the Annual Report of the year's work (see page 405.)

The Treasurer's Accounts were submitted.

S. A. Stewart proposed and W. Swanston seconded that these Reports be passed and circulated in Proceedings.

On the motion of F. W. Lockwood, seconded W. Swanston, the Rev. C. H. Waddell, B.D., was elected President. On the motion of J. Wright, F.G.S., seconded by William Gray, Francis J. Bigger, M.R.I.A. was elected Vice-President; on the motion of J. Vinycomb, seconded by W. D. Donnan, W. H. Phillips was re-elected Treasurer. William Swanston, F.G.S. was re-elected Librarian.

The Committee was proposed by William Swanston, seconded by J. Carson :—Leonard Bell, W. J. Fennell, William Gray, M.R.I.A., John Hamilton, F. W. Lockwood, S. A. Stewart, F.B.S.E., Miss S. M. Thompson, John Vinycomb, M.R.I.A., Robert Welch, Joseph Wright, F.G.S.

Francis Joseph Bigger tendered his resignation as hon. Sec. which was accepted with regret. On the motion of J. Wright, seconded by W. Gray, James St. J. Phillips and W. Donnan were elected as Honorary Secretaries. The Reports of the Botanical and Geological Sections were submitted (see p. 431).

A number of places were named as localities for Excursions during Summer Session.

A note from Leonard Bell was read calling attention to a new locality for Graptolites of which specimens were shown.

William Swanston proposed, John Vinycomb seconded,—That it is most desirable that greater attention be given to Field Work at the Club's excursion, Mr. Gray be requested to act as Field Lecturer for the coming season.

From the intimate and valuable knowledge which Mr. Gray possesses of the Archæology and Geology of the district it is felt by the Committee that if he would undertake this work, the excursions would be much enhanced in their instructive value to those who attend them, and the valuable and accurate information which Mr. Gray has accumulated by many years of study and investigation would thus find its way in a most profitable and popular form into the Club's Proceedings.

This concluded the business part of the programme, after which a note on Foraminifera of the Irish Carboniferous Rocks by Fred Chapman, F.R.M.S., was read.

James St. J. Phillips then exhibited and described a fine collection of Lantern Slides obtained from the Geological Committee of the British Association.

Some Local Botanical Notes were received from R. L. Praeger and taken as read. As these notes are of general botanical interest they are given *in extenso*.

REPORT OF THE BOTANICAL SECTION.

Six Meetings have been held during the winter on Saturday afternoons in the Club Rooms, and while the attendance has not been large it has proved constant and interest in the subjects been maintained. The systematic study of the more important British Natural orders, commenced two years ago, has now been completed, following the lines of "Oliver's Lessons" The want has been severely felt of proper books, diagrams, and lantern slides to illustrate the subject, a want

which we hope may in time be supplied. During the year copies of Mackay's *Flora Hibernica* and Babington's Handbook have been purchased for the Section.

Not much progress has been made in supplying the blanks in the Club Herbarium, but a number of plants have been promised and it is hoped many may be collected for the purpose next summer.

Two excursions were carried out, one to Killeen Glen, and one to the Sandhills of Ballykinlar.

At one of the Winter Meetings, after tea in the Museum, a presentation was made to Rev. C. H. Waddell by members of the Section of a copy of "Kerner's Natural History of Plants."

We hope that the interesting course of lectures lately delivered by Mr. R. L. Praeger may stir up more popular interest in the subject of botany.

C. H. WADDELL.

REPORT OF THE GEOLOGICAL SECTION, 1897-98.

In this, the Fifth Annual Report, the Committee of the Geological Section have again to record the continuation of the work for which the Section was founded. Papers were read on special branches in which the Members are interested. These were as follows :—

R. Bell, "The Rocks of the Squires Hill."

Miss S. M. Thompson, "Recent Work in Glacial Geology."

James St. J. Phillips, "Crystals as they occur in Rocks."

Miss M. K. Andrews, "Notes on the Granite and other rocks at Newcastle."

These evening meetings drew a fair attendance of Members, but are deserving of still better support, as they afford facilities for the interchange of information among the Members which could hardly be obtained at the larger General Meetings of the Club.

The year has been marked by the publication of Dr. Hume's Paper on the Cretaceous Rocks of Antrim, in which is ac-

knowledgeed particular help received from S. A. Stewart, Robert Bell, and other members of the Section.

The thanks of the Section are due for the following gifts :—

Professor A. J. Cole, F.G.S., M.R.I.A., “The Rocks of Slieve Gallion.” Trans. Royal Dublin Society.

R. Welch, Erratics dredged up near Rathlin.

W. De V. Kane, M.A., Specimen of Diorite.

R. Bell, Collection of opals from Sandy Braes.

„ Collection of Zeolites from Squires Hill.

Leo W. Bell, Graptolites from new locality near Ballynahinch.

F. Chapman, F.R.M.S., Two Micro-Slides of Carboniferous Limestone.

JAS. ST. J. PHILLIPS,

Hon. Sec. of Section.

LOCAL BOTANICAL NOTES, 1895-97.

By R. LLOYD PRÆGER, B.E.

During the three seasons that have now elapsed since the *Supplement to the Flora of the North-east of Ireland* was published, although no extensive botanical work has been carried out in our district, local observers have not been idle, and a summing up of results shows several additions to the flora, some valuable re-discoveries of species supposed to be extinct, and interesting extensions of the range of several of our rarest plants. The additions to the flora of district XII. include *Cochlearia anglica*, *Rubus oigoclados* var., *Crithmum maritimum*, *Galium erectum* (the *G. Mollugo* of former lists), and *Glyceria plicata*. Equally important, and to the local field botanist even more interesting, is the restoring to the local list of certain plants which have long been sought in vain, and were believed to be extinct in the district. Such are *Epilobium roseum*, one of Templeton's records, which Mr. Davies has recently discovered in several stations in the Lagan valley ;

Carex filiformis, a Lough Neagh plant, destroyed along with several others by drainage operations half a century ago, and which I had the good fortune to find last year in southern Down; and *Calamagrostis epigeios*, which had not been seen in the district since Dr. Moore's original discovery of it over sixty years ago. The first of these ranks as addition an to the flora of district XII., since Stewart and Corry placed it in the "excluded" list. It is also most satisfactory to have new stations recorded for *Elatine hexandra*, *Silene noctiflora*, *Dryas octopetala*, *Carum verticillatum*, *Carduus crispus*, *Carlina vulgaris*, *Stachys Betonica*, *Typha angustifolia*, *Cladium jamaicense*, *Carex teretiuscula*, and *C. aquatilis*, plants which are numbered among the rarest in the district, and some of which appeared to be losing ground. The new county records tot up as follows :—

DOWN—*Rubus oigoclados*, *Crithmum maritimum*, *Galium erectum*, *Carex teretiuscula*, *C. filiformis*.

ANTRIM—*Silene noctiflora*, *Dryas octopetala*, *Galium erectum*.

DERRY—*Cochlearia anglica*, *Hypericum dubium*, *Lemna gibba*, *Milium effusum*, *Glyceria plicata*.

The more important finds since the publication of the *Supplement*, are as follows :—

Cochlearia anglica, Linn.—At the New Buildings near Londonderry, Mrs. Leebody, 1895.

Silene noctiflora, Linn.—By the railway on the Curran, Larne, in some quantity, R. Ll. P., 1897. A very doubtful native in Ireland.

Elatine hexandra, DC.—Loughbrickland, Co. Down, H. W. Lett, Watson Bot. Exch. Club Report, 1895-96.

Hypericum dubium, Leers.—Ballykelly, Co. Derry, Mrs. Leebody, 1896.

Rubus oigoclados, M. & L. var. *Newbouldii*, Bab.—Loughbrickland, Co. Down, H. W. Lett, W.B.E.C. Report, 1895-96.

Dryas octopetala, Linn.—On cliffs north of Knock Dhu, Co. Antrim, fairly plentiful, H. W. Lett; S. A. Stewart, *J.N.*, vol. VI., p. 280, 1897.

- Geum rivale* x *urbanum* (*intermedium* Ehr.)—Garvagh Demesne, Co. Derry, Miss Knowles. Near Limavady, B.N.F.C.; *I.N.*, vol. IV., p. 221, 1895.
- Epilobium roseum*, Schreb.—Ballyskeagh, Co. Down; Glenmore and Ballydrain, near Lisburn, Co. Antrim, J. H. Davies, *I.N.*, Vol. VII., p. 7 and 41, 1897. Mr. Davies considers the plant native in these stations.
- Carum verticillatum*, Koch.—Wet moor at Carnsampson, near Ballycastle, Co. Antrim, 1897, R.L.P.
- Crithmum maritimum*, Linn.—Kearney Point, Co. Down, Samuel Moore, and near Bangor [at Carnalea], P. F. Gulbransen; S. A. Stewart, *I.N.*, Vol. V., p. 297, 1896.
- Ligusticum scoticum*, Linn.—Skernaghan Point, Islandmagee, Co. Antrim, C. J. Lilly, 1896.
- Galium erectum*, Huds.—Mr. J. H. Davies has shown (*I.N.*, Vol. VI., p. 259, 1897) that all the stations of *G. Mollugo*, from which specimens are forthcoming, must be transferred to *G. erectum*, and that *G. Mollugo* must, for the present at least, be withdrawn from the North-eastern flora. The known distribution of *G. erectum* in the North-east, as shown by Mr. Davies' paper, is briefly as follows:—
- DOWN.—Loughbrickland (Lett), Rowallane near Saintfield (Redmond and Waddell).
- ANTRIM.—Glenarm (Holden and Dickie), Glenmore near Lisburn (Davies), Whitewell (Stewart), Cullybackey (Miss Knowles and Buick).
- Carduus crispus*, Linn.—About the old church at St. John's Point, Co. Down, R.L.P., *I.N.*, Vol. VI., p. 85, 1897.
- Carlina vulgaris*, Linn.—Plenty of fine specimens on sandhills below Rathmullan, Dundrum Bay, R.L.P., 1898.
- * *Veronica peregrina*, Linn.—Fields at Magilligan, Co. Derry, Mrs. Leebody, 1897. An alien abundant in some districts of Tyrone and Donegal (see *I.N.*, Vol. V., p. 247, 1896).
- Stachys Betonica*, Benth.—Near Whitehall, Broughshane, Co. Antrim, S. A. Brennan; R.L.P., *I.N.*, Vol. V., p. 297, 1896.

- Typha angustifolia*, Linn.—Bishop's mill, 3 miles north of Portaterry, R.L.P., *I.N.*, Vol. VI., p. 280, 1897.
- Lemna gibba*, Linn.—Near Magilligan, Mrs. Leeboby, 1897.
- Cladium jamaicense*, Crantz.—Lake half mile N.W. of the "White Hills," near Strangford, Co. Down, abundant, R.L.P., *I.N.*, Vol. VI., p. 219, 1897.
- Carex teretiuscula*, Good.—Wet sphagnous bog near Giant's Ring, Co. Down, "in all likelihood Orr's original locality," J.H. Davies, *I.N.*, Vol. V., p. 270, 1896.
- C. aquatilis*, Wahlenb.—By the Braid River at Ballymena, and on both sides of the Main River from Hillmount (Cullybackey) to Slatt Bridge, Co. Antrim, Miss Knowles.
- C. filiformis*, Linn.—Abundant with *Cladium* in lake half mile N.W. of the "White Hills" near Strangford, Co. Down, R.L.P., *I.N.*, Vol. VI., p. 219, 1897.
- Calamagrostis epigeios*, Roth.—Refound at Formoyle Hill, Co. Derry, very sparingly, by R.L.P. and Miss Knowles, August, 1895.
- Milium effusum*, Linn.—Wood at Carrickhue, Co. Derry, Mrs. Leeboby, 1896.
- Glyceria plicata*, Fr.—Ditch near Formoyle Hill, Co. Derry, R.L.P., *I.N.*, Vol. VI., p. 99, 1897.

Several interesting records are held over for further confirmation or research.

Of non-native plants, some interesting species have been found. *Epilobium roseum*, which Stewart and Corry treated as a lost casual, has been rediscovered in the district by Mr. Davies, who considers it indigenous, and I have treated it as a native on his authority. *Veronica peregrina* is also inserted above, since it is naturalized and abundant over a large district in Donegal and Tyrone, and its spread into Derry was to be expected. Of plants with a less claim to a place in our flora, the following may be mentioned :—

- Draba muralis*, Linn.—Old bridge near Armoy, Co. Antrim, plentiful, B.N.F.C.; *I.N.*, Vol. V., p. 184, 1896.
- Alyssum calycinum*, Linn.—Fields at Magilligan, Co. Derry, Mrs. Leeboby, 1897.

- Trifolium agrarium*, Linn.—Fields at Drumbo, Co. Down, J. H. Davies, *I.N.*, Vol. VI., p. 299, 1897.
- Hieracium Auricula*, Linn.—Spoil-bank of limestone quarry, Whitewell, Belfast, S. A. Stewart, 1897.
- Leonurus Cardiaca*, Linn.—Cranfield Point, Co. Antrim, B.N.F.C. ; *I.N.*, Vol. VI., p. 249, 1897.
- Chenopodium murale*, Linn.—At Ballyruder, Co. Antrim, at a place where hens are fed, R.L.P., *I.N.*, Vol. VI., p. 299, 1897.
- Plantago media*, Linn.—Lawn at Lisburn, Co. Antrim, J. H. Davies, *I.N.*, Vol. V. p. 311, 1896. At Bellarena, Co. Derry, Mrs. Leebody, 1897.
- Polygonum sachalinense*, Schmidt.—Glenmore, near Lisburn, J. H. Davies, *I.N.*, Vol. V., p. 309, 1896.
- P. Bistorta*, Linn.—Shrubbery at Saintfield, and graveyard at Knock, Co. Down, C. H. Waddell, *I.N.*, Vol. IV., p. 306, 1895.
- Stratiotes Aloides*, Linn.—Dam near Carrickfergus, B.N.F.C. ; *I.N.*, Vol. V., p. 185, 1896.
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R U L E S

OF THE

Belfast Naturalists' Field Club.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the object of the Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall first pay an entrance fee of 5/-, and be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of the votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club; and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Librarian, and two Secretaries, and ten Members, who form a Committee, and shall hold not less than eight Meetings in the year. Five Members to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

The Committee may from year to year appoint a Sectional Committee as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six Members of the Club, not less than two being members of the Club's Committee. No financial responsibility to be incurred by the Sub-Committee or any officer of the Club without the previous approval of the Club's Committee. Any Sub-Sectional Committee may elect its own Chairman and Secretary from its members.

VII.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VIII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to be original and to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

IX.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collections of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

X.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

XI.

Members of other Irish Field Clubs residing temporarily or permanently in or near Belfast may be enrolled members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year on production of a receipt showing that such

subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XII.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subject mentioned in such written requisition.

XIII.

That the Committee may be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its members by such other societies.

NOTICE.

EXCHANGES OF PROCEEDINGS.

Amierfs Societe Linneenne du Nord de la France

Tome XII., Nos. 271, 282.

Barrow Naturalists' Field Club.

Annual Report and Proceedings, Vol. XI.

Bath Natural History and Antiquarian Field Club.

Proceedings, Vol. VIII., No. 4.

Belfast—Natural History and Philosophical Society.

Report and Proceedings, 1895-96.

„ Ulster Journal of Archaeology.

Berwick Field Club.

History Vol. XV.

Brighton and Sussex Natural History and Philosophical Society.

Abstract of Papers and Annual Report, 1897.

Bristol Naturalists' Society.

Proceedings, Vol. VIII., Part II.

Canadian Institute.

No. 1, Vol. I., Part I.

Cornwall—Royal Institution.

Journal, Vol. XIII., Part 2.

Costa Rico—Museo Nacional de Costa Rico, Informe presentado al senor Secretario de Estado en el despachs de Fomento. And other papers.

„ Primera Exposicion Ceutioamencana de Guatemala Documentos

Dublin—Royal Irish Academy.

Proceedings, 3rd Series, Vol. IV., No. 2, 3, 4.

Transactions, Vol. XXXI., Parts 1, 2, 3, 4, 5, 6.

„ Royal Society of Antiquaries of Ireland.

Journal, Vol. VII., Parts 1, 2, 3, 4.

Vol. VIII., Part 1.

„ Naturalists' Field Club.

Annual Report, 1897.

Dumfries and Galloway—Natural History and Antiquarian Society.

Transactions, 1893-4, 1895-6.

Edinburgh—Geological Society.

Transactions, Vol. VII., Part III.

Frankfort—Helios, 1897.

„ Societatum Litterarum.

Jahrgang X., 7 to 12, Vol. XI., 1 to 6.

„ Senckenbergische naturforschende Gesellschaft
Bericht, 1897.

Halifax, N.S.—Nova Scotian Institute of Science.

Proceedings and Transactions, Vol. IX., Part III.

Hamilton Association.

Journal and Proceedings, No. XIII.

Hertfordshire Natural History Society.

Transactions, Vol. IX., Part 4.

Leeds Philosophical and Literary Society.

Annual Report, 1897.

London—Geologists' Association.

Proceedings, Vol. XV., Parts 4, 5, 6.

„ British Association for the Advancement of Science.

Report, 1897.

„ Reliquary and Illustrated Archæologist.

Vol. III., Nos. 3, 4.

Vol. IV., Nos. 1, 2.

Leicester—Literary and Philosophical Society.

Report of Section F.

Manchester Field Naturalists' and Archæologists' Society.

Report and Proceedings, 1896.

„ Microscopical Society.

Transactions, &c., 1896.

Marlborough—Natural History Society.

No. 45-6.

Montevideo—Museo Nacional de Montevideo.

Anales, VI.

New Brunswick—Natural History Society.

Bulletin, No. XV.

Norfolk and Norwich Naturalists' Society.

Transactions, Vol. VI., Part 3.

Penzance—Natural History Society.

List of Members.

Stavanger—Museum.

Aarsberetning for 1896.

Yorkshire Naturalists' Union.

Transactions, Part 21.

Carboniferous Flora, by Robert Kidston. F.R.S.E., F.G.S.

U.S.A.—Boston Society of Natural History.

Proceedings, Vol. XXVIII.

„ Chapel Hill N.C.—Elisha Mitchell Scientific Society.

Journal, Vol. XIII., Parts 1, 2, Vol. XIV., Part 1.

„ Milwaukee.

Fourteenth Annual Report, 1896.

„ Missouri—Botanical Garden.

Report, 1897.

„ New York—American Museum of Natural History.

Bulletin, Vol. IX., 1897.

Annual Report, 1896.

„ Philadelphia—Academy of Sciences.

Proceedings, 1897, Part 1.

„ Philadelphia—American Philosophical Society.

Proceedings, Vol. XXXVI., No. 154.

- „ Portland—Society.
 Proceedings, Vol. II., Part 4.
- „ Salem—Essex Institute.
 Vol. XXVI., Part 4—12.
 Vol. XXVII., Part 1—12.
 Vol. XXVIII., 1—6.
 Vol. XXIX., 1—6.
- „ Staten Island Natural Science Association.
 Proceedings, Vol. VI., No. 7—15.
- „ St. Louis—Academy of Science.
 Transactions, Vol. VII., No. 4—16.
- „ Washington—Smithsonian Institution.
 Report, 1895.
- „ „ U.S. National Museum, 1893-4.
- „ „ United States Geological Survey.
 Annual Reports, 1895-6, Parts 1 and 2.
- „ „ Memoir of Geo. Brown Goode.



BELFAST NATURALISTS' FIELD CLUB.

THIRTY-SIXTH YEAR, 1898-99.

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Any Changes in the Addresses of Members should be at once notified to the Secretaries by Post Card.

- Adams, John J., M.D., Ashville, Antrim.
 Adams, John, The Manse, Antrim.
 Adams, John, New King Street.
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 Boyd, J. St. Clair, M.D., 27 Great Victoria Street.
 Boyd, Miss, Cultra House, Holywood.
 Boyd, Miss Ethel, 43 Victoria Place.
 Boyd, Wm., 43 Gt. Victoria Street.
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 Brandon, Hugh B., Royal Avenue.
 Brown, Robert, B.A., Wingfield Lodge, Bloomfield.
 Breakey, Rev. J. P. R., M.A., The Rectory, Armoy.
 Brennan, Rev. S. A., B.A., Knocknacarry.
 Brett, Chas. H., Grettan Villa South.
 Bristow, Rev. Canon, St. James' Parsonage.
 Brown, John, Longhurst, Dunmurry.
 Brown, Thomas, 102 Donegall St.
 Brown, Wm., 18 Chichester Street.
 Browne, W. J., M.A., 5 Crawford's Square, Derry.
 Bruce, Miss E., "The Farm."
 Bulla, Charles, 87 Wellesley Avenue.
 Burnett, John R., Rostellan, Malone Road.
 Burtchaell, George D., M.A., 7 St. Stephen's Green, Dublin.
 Campbell, J. O., B.E., Ravenhill Road.
 Campbell, Thomas James, Rathmore, Antrim, Co. Antrim.
 Carson, J. C. 73 Victoria Street.

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Carruthers, Miss, 9 Claremont St.
Carter, W., Cultra, Co. Down.
Carter, W. Charles, 30 Donegall
Place.
Christie, Rev. W. J., 13 Cliftonville
Avenue.
Cleland, Jas. A., Wellington Park.
Cleland, W. W., 48 Wellington
Park.
Cleland, Mrs. Annie, 32 Lower
Easton Street, Cliftonville.
Cleland, Alex. M.J., 32 Lower
Easton Street, Cliftonville.
Coates, John D., 41 Chichester St.
Cochrane, Robert, M.R.I.A., 17
Highfield Road, Dublin.
Colbeck, James, Shaw's Bridge.
Cole, Rev. Richard, Armagh.
Coleman, J., H.M. Customs, South-
ampton.
Collis, Rev. H. F. M., B.D., Antrim.
Corley, Miss E., 52 Elmwood Av.
Corley, Miss Kate A., 52 Elmwood
Avenue.
Corry, W. F. C. S., Glenbank,
Bangor.
Cosgrove Henry, 35 Rugby Road.
Costigan, Wm., Gt. Victoria Street.
Coulson, Gerald, 4 College Street
South.
Coulter, Mrs., 21 University Square.
Cowan, P. C., C.E., Downpatrick.
Crawford, F. H., 20 Mill Street.
Creeth, James, Victoria Square.
Crymble, George G., Gordon House,
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Culbert, Robert, Distillery Street.
Cunningham, Chas M., 18 College
Square East.
Cunningham, Samuel, Glencairn,
Belfast.
Curley, Francis, High St., Belfast.
Curley, Mrs., Dunedin Ter., Belfast.

Dalton, John P., 4 Roseberry Villas,
Chichester Park.
Darbishire, R. D., Victoria Park,
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Davies, John Henry, Glenmore
Cottage, Lisburn.
Day, Robert, Cork.
D'Evelyn, Alex. M., M.D., Bally-
mena.
Dickson, John M., Hillbrook, Holy-
wood.
Dickson, Wm. W., 52 Pakenham
Place.
Dickson, W. H., Dunowen.
Donaldson, George, Box 202, Adams
Mass., U.S.A.
Donaldson, John, 18 Brookhill Av.
Donnan, W. D., M.D., High Street,
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Downing W. M., 25 Garfield Street.
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Dufferin and Ava, Marquis of,
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Dunlop, Fleet Surgeon, Edenderry
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Duncan, Wm., 2 Canterbury Street,
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Elliott, George H., Holywood.
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Ewart, Clement C., Glenbank.
Ewart, Ernest, Glenbank.
Ewart, William Q., Glenmachan.
Ewart, Sir William Q., Bart., Glen-
machan.

Faren, W., 11 Mountcharles.
Fennell, W. J., Chichester Street.
Ferguson, G. W., Donegall Park.
Ferguson, Henry, Donegall Park.
Ferguson, James H., 2 Wellesley
Avenue.
Finlay, Miss, 42 Wellington Park.
Firth, Joseph, Whiterock.
Firth, William A., 92 Cliftonpark
Avenue.
Foster, T. W., M.A., 1 Clonsilla
Antrim Road.
Foster, Rev. G., Lurgan, Co.
Armagh.

Fraser, R. N., 271 Albertbridge Road.

Frame, James, Ballygowan, Co. Down.

Frame, John, 6 Lawrence Street.

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Galway, J. C., Wynstay, Rosetta Park.

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Gailey, T. A., 10 Ardenvohr Terrace, Woodstock Road.

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Galway, William H. 3 Dufferin Buildings, Bangor.

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Gulbransen, A., 17 Queen's Arcade.

Hamilton, John, 5 Church Avenue, Holywood.

Hanna, Richard, Charleville Street, City.

Hanna, William, M.A., M.B., Lisanore Villa, Antrim Road.

Henry, Hanna, A.B., Royal College of Science, Dublin.

Hanna, Miss Margaret J., 3 Hopefield Terrace, Antrim Road.

Harbison, Mann, Rostrevor.

Hardy, Gardner, 5 Wellington Park.

Harkness, Miss Lizzie, Coil-mara, Cultra.

Haslett, Sir Jas H., J.P., Princess Gardens.

Hazelton, W. D., 35 Linenhall Street.

Hazelton, Wm., Agathona, Bloomfield.

Henderson, J., 20 Upper Frank St.

Herdman, A. T., 36 Wellington Park.

Heron, F. A., Cultra, Holywood.

Heritage, Miss, Wolsley Villa, Bloomfield.

Hill-Littler, Robert, Tareen, Chichester Park.

Hobson, Benjamin, 6 Hopefield Avenue.

Hogg, A. R., 73 Victoria Street.

Holden, J. S., M.B., Sudbury, Suffolk England (Cor. Mem.).

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Houston, C., Granville Gardens.

Inglis, William, Riverston Terrace, Holywood.

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Johnson, W. S., Knockbreda Park.

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Johnston, Miss E., Dunesk, Stranmillis.

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Johnston, Miss A., Lisnaveane, Donegall Park, Antrim Road.

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- Kilpatrick, W. J., Donegall Place.
- Kennedy, F. J., 4 Clarence Place.
- Kirker, S. K., Offices of Board of Public Works, Belfast.
- Kirkpatrick, F., 78 Anu Street.
- Kirkwood, J. A. Dundonald.
- Kinahan, John, Lowood, Belfast.
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- Lamb, Miss, Divis View, Lisburn Road.
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- Letts, Professor E. A., Dunavon, Craigavad.
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- Lockwood, F. W., 2 Brookhill Avenue.
- Lodge, Chas. W., 26 Royal Avenue.
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- Lowry, D. E., 25 Donegall Place.
- Lyttle, Rev. R., The Manse, Moneyrea, Comber.
- MacCormac, Dr. John, Gt. Victoria Street.
- MacBride, Rev. R., The Manse, Dundrod.
- MacDonald, Wm. Carlisle Circus.
- MacElheran, W. F., 3 College Gardens.
- Mackenzie, John, Malone, Belfast.
- MacKinnon, Mrs. Coleraine.
- Maconachie, Rev. Jas., 4 Cliftonville Avenue.
- Macoun, W. Godfrey, 8 Claremont Terrace, Belfast.
- Major, Rev. J. J., 13 The Mount, Mountpottinger.
- Malcomson, Greer, Malone Park.
- Malcomson, Jas., Cairnburn, Strandtown.
- Mann, Jas. S., Ballyholme, Bangor, Co. Down.
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- Marsh, Joseph C., 2 Chichester Gardens.
- Marshall, H., Edlingham Terrace, Duncairn Gardens.
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- Martin, J. McClelland, Northern Counties Railway.
- Massaroon, Mrs., 42 Wellington Park.
- Mathewson, Mrs., Helen's Bay.
- Maxton, Jas., The Elms, Strandtown.
- May, Robert, 137 Elgin Terrace, Antrim Road.
- Megarry, John, 202 Beaconsfield Terrace, Grosvenor Street.
- Millen, Saml. S., B.A., 44 Ulster-ville Avenue.
- Milling, A. M. Miss., Woolsey Villas, Malone Park.
- Milligan, A., 225 Springfield Road.
- Milligan, S. F., M.R.I.A., Alberta, Malone Road.
- Moore, John, Shaftesbury Square.
- Moore, Dr. J. B., 4 Mountpottinger Road.
- Moore, Wm., 5 Ardenvohr Terrace.
- Moore, Miss, Corunna House, Ballynaveigh.
- Moore, James, Corunna House, Ballynaveigh.

Moore, S. A., 2 Howard Street.
 Morrison, Hugh, Ligoniel.
 Morrow, David, Coole Avon, Holywood.
 Morton, John, Cliftonpark Avenue.
 Moss, Wm., 6 Princess May Gardens, Antrim Road.
 Murdoch, James, Balmoral Cottage.
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 M'Afee, George, Walmer Terrace, Holywood.
 M'Alery, J. M., Rosemary Street.
 M'Alister, Thos., 2 Rosetta Gardens, Ormeau Road.
 M'Cance, J. S., Dunmurry.
 M'Chesney, Jos., Holywood.
 M'Clean, F. P., Huntley Villas, Belfast.
 M'Cleery, H., 82 Cliftonpark Av.
 M'Cleery, Wm. H., 22 Landscape Terrace.
 M'Connell, James, Annadale Hall, Ballynaveigh.
 M'Connell, Miss, Annadale Hall, Ballynaveigh.
 M'Cormick, H. M'Neile, Craigavad.
 M'Cormick, John, The Hermitage, Bloomfield.
 M'Creery, James, 257 Albertbridge Road, Belfast.
 M'Cullough, John, Martello, Holywood.
 M'Cullough, Wm., Belfast Bank, Newtownards.
 M'Cutcheon, Miss, B.A., Terraquin, Balmoral Avenue.
 M'Dermott, Rev. John, Belmont, Belfast.
 M'Dowell, T., c/o Messrs. Dunville & Co., Belfast.
 M'Gaw, Miss, 17 Wellington Park Terrace.
 M'Iroy, J. Milford, Strandtown.
 MacIlwaine, J. H. Ravensdale, Strandtown.
 MacIlwaine, Mrs., Ravensdale, Strandtown.
 M'Kee, John, Solicitor, Prince's Chambers, Ann Street.
 M'Kee, Robert, M.A., Harlesden College, Bramshill Rd., London, N.W.

M'Kee, Wm. S., 20 Mill Street.
 M'Kenzie, Dr. W. G., Gt. Victoria Street.
 M'Kinney, W. F., Ballyvessey, Carnmoney.
 M'Kisack, Alfred, Hope Street Factory.
 M'Kisack, C. J., 12 Mountcharles.
 M'Kisack, Dr. H. L., College Sq. East.
 M'Lean, Geo., 19 Pottinger Street.
 M'Leish, John, "The Mount," Mountpottinger.
 M'Mordie, David, 2 Belgravia Av., Belfast.
 M'Mordie, James, Belgravia Av., Belfast.
 Nicholson, H. J., 5 West Elmwood.
 Nesbitt, W. C., Kennaird Terrace.
 O'Neill, Henry, M.D., 6 College Square East.
 O'Neill, James, M.A., 5 College Square East.
 Orr, H. Lamont, Garfield Street.
 Olley, Robert, 69 University Av.
 Patterson, D. C., Clanbrassil Ter., Holywood.
 Patterson, R. L., jun., 31 Botanic Avenue.
 Patterson, Wm. H., jun., Clanbrassil Terrace, Holywood.
 Patterson, Richard, J.P., Kilmore, Holywood.
 Patterson, Miss Clara, Kilmore, Holywood.
 Patterson, Robert, F.Z.S., Ivy Dene, Malone Park.
 Patterson, Wm. H., M.R.I.A., Garrahanard, Strandtown.
 Paul, Thomas, Redcot, The Knock.
 Payne, J. C. C., J.P., Oxford Buildings.
 Perry, T. G. Lisburn Road.
 Phillips, Wm. H., Lemonfield, Holywood.
 Phillips, Jas. J., 61 Royal Avenue.
 Phillips, Jas. St. J., B.E., Royal Avenue.
 Pim, John, J.P., Bonaven, Antrim Road.

Pim, Thos. W., 21 Victoria Street.
Pim, Joshua, Slieve-na-failthe,
Whiteabbey.

Porter, F. A., Queen's Square.
Porter, Wm., Beechview, Balmoral
Avenue.

Praeger, E. A., Holywood.
Praeger, R. LL., M.R.I.A., National
Library, Kildare St., Dublin.
Purdon, Mrs., 5 Wellington Place.

Quail, Rev. Patrick, Dunmore,
Ballynahinch

Redmond, David, Antrim.
Reid, Robert, King Street, Belfast.
Renold, August, Ullswater Terrace,
Cavehill Road.

Ritchie, James, c/o Millar, Boyd, &
Reid, Calendar Street.

Robertson, J. C., Methodist College,
Belfast.

Robinson, W.H., 29 Spencer Street
Robinson, Saml., Helen's Bay, Co.
Down.

Rowley, Wm. M., 22 Rosemary
Street.

Russell, John, C.E., Waring Street.

Scott, Conway, C.E., Windsor Av.
Shanks, James, Ballyfounder, Porta-
ferry.

Scott, Rev. Oswald, A.M., 1 Hampden
Terrace, Rugby Road, Belfast.

Sharpe, Robert, 100 Fitzroy Avenue.

Shaw, Cecil, M.D., 14 College Sq.
East.

Shaw, Wm. Hinde, Brooklyn, Knock.

Shaw, Lancelot, Brooklyn, Knock.

Shaw, Mrs., Brooklyn, Knock.

Shepherd, Percy, N. C. Railway.

Sheldon, Charles, M.A., Belfast
Royal Academical Institution.

Skillen, Joseph, Ballee, Ballymena.

Silly, George, Ardene, Sydenham.

Sinclair, F. Howard, M.D., Paken-
ham Place.

Slater, William, National School,
Strandtown.

Small, Hugh, Sullivan School, Holy-
wood.

Smith, Rev. W. S., The Manse,
Antrim.

Smith, Dr. Lorraine, 33 Stranmillis
Road, Belfast.

Smyth, Walter, F.L.S., Woodview,
Holywood.

Smyth, Sydney B., M.D., Great
Victoria Street.

Smith, G., Linenhall Library.

Smythe, Ven. Archdeacon, Coole
Glebe, Carnmoney.

Smyth, Mrs. Proctor, 50 Duncairn
Street.

Somerset, Robert, 25 Cavendish
Street.

Speers, Adam, B.Sc., Up Sullivan
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Staples, Sir N. A., Bart., Lissan,
Dungannon (Life Mem.).

Steele, Miss, 45 University Street.

Stears, Samuel, 79 Ormeau Road.

Stelfox, James, C.E., Oakleigh,
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Stephens, Mrs., Whitehead, Co.
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Stevenson, John, Coolavin, Malone
Road.

Stevenson, J. M'N., Carrickfergus.

Stewart, Rev. J. A., Pond Park,
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Stewart, S. A., The Museum,
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Stewart, W. J., 31 Adelaide Street.

Strain, David, Carlisle Circus (Ulster
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Swanston, Wm., F.G.S., 18 Clifton-
ville Avenue.

Swanston, Mrs., 18 Cliftonville Av.

Symington, Saml., Ballyoran, Dun-
donald.

Symington, Professor, F.R.S.E.,
Queen's College.

Tate, Alexander, C.E., Rantallard,
Whitehouse, Belfast.

Taylor, E. E., Garfield Chambers,
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Thomas, S. G., 14 Woodland Av.

Thompson, Miss S. M., Macedon,
Belfast.

- Thompson, Mrs. H., 14 Upper Crescent, University Road.
 Thompson, Rev. David, Dromore, Co. Down.
 Thompson, Prof. W. H., Queen's College, Belfast.
 Todd, John, Clarinda, Fortwilliam Park.
 Todd, C. H., Wolsley Villa, Bloomfield.
 Todd, Wm. A., 24 Victoria Street.
 Traill, W. A., Bushmills.
 Tuiloch, Miss, Howard Street.
 Turner, Alf., North Queen Street.
 Turtle, Chas. C., Claremont, Strandtown.
 Vint, Joseph H., Ulster Bank, Donegall Place.
 Vinycomb, John, M.R.I.A., Hollywood.
 Vinycomb, T. Bernard, Riverside, Hollywood.
 Waddell, Rev. C. H., M.A., B.D., The Vicarage, Saintfield.
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 Walker, Thos. R., Rugby Road.
 Walkington, Miss, LL.D., Strandtown.
 Walkington, T. R., Edenvale, Strandtown.
 Walsh, Robert, Abbotsford, Malone Road.
 Walmsley, Rev. Douglas, B.A., Redburn, Adelaide Park.
 Ward, T. Eden Crescent, Antrim Road.
 Ward, Phillip, 12 St. Paul's Terrace, City.
 Wardell, Miss, 63 Botanic View, University Road.
 Watson, Thomas, Shipquay Gate, Londonderry.
 Waugh, Isaac, 8 Ava Terrace, Bangor.
 Welch, R. J., 49 Lonsdale Street.
 Wheeler, Mrs. Lennoxvale, Belfast.
 Whitla, Professor, M.D., College Square North.
 Wilson, James, C.E., Oldforge, Dunmurry.
 Wilson, James, Ballybunder, Killylinchy.
 Wilson, Alec. G., Stranmillis.
 Wilson, W. H. Stranmillis.
 Wilson, Jas. F. D., 82 Joy Street.
 Wilson, Geo., Bedford Street.
 Wilson, Abraham, 13 Springfield Rd.
 Wilson, Thomas, C.E., Fleetwood Street.
 Wise, B. D., Waterside, Greenisland.
 Wolseley, Charles, Ballymena.
 Woolcombe, Dr. Robert LL.D., M.R.I.A., 14 Waterloo Road, Dublin.
 Woodward, Mrs., The Vicarage, Ligoniel.
 Workman, Rev. R., M.A., Rubane, Glashry.
 Workman, Thos. J.P., Helen's Bay.
 Wright, Joseph, F.G.S., Alfred St.
 Wright, Miss, Alfred Street.
 Wylie, William, 8 Mountpleasant.
 Young, Robert, J.P., C.E., Rathvarna, Chichester Park.

ANNUAL REPORT AND PROCEEDINGS
OF THE
BELFAST
NATURALISTS'
FIELD CLUB

For the Year ending the 31st March, 1899

(THIRTY-SIXTH YEAR.)

SERIES II.

VOLUME IV.



PART VI.

1898-99.

Belfast :

PRINTED FOR THE CLUB

BY ALEXANDER MAYNE & BOYD, 2 CORPORATION STREET,
PRINTERS TO QUEEN'S COLLEGE, BELFAST.

1900.

REPORT.

THE Committee of the Belfast Naturalists' Field Club now lay before the Members the Thirty-sixth Annual Report.

During the past Session the work of the Club has been carried on as usual. A new feature of interest was added to the Excursions in the appointment of a Field Lecturer, who on suitable occasions delivered a short address on the objects of Archæological and Natural History interest met with on each Excursion. These addresses were much appreciated for the information conveyed in them, and we hope that in future Excursions we may have a greater attendance of specialists who would impart their information for the benefit of beginners and new members.

During the past Summer the following Excursions were made :—

Antrim to Larne	..	..	..	28 May.
Mellifont	..	..	..	11 June.
Carlingford	..	..	..	24, 25 June.
Kenmare (Field Club Union)			..	7 to 13th July.
Barney's Point	..	..	..	30 July.
St. John's Point	..	..	..	20 August.
Hollymount	..	..	..	10 September.

All were well attended with the exception of that to Carlingford—which may be, perhaps, accounted for by the fact of its immediately preceeding the Excursion to Kenmare, held in conjunction with the Irish Field Club Union, which forty-two of our members attended.

The winter meetings were as follows :—

- 2 Nov., Conversazione.
- 15 „ Plant Societies and Distribution of Plants in N.E. Ireland.
- „ The President's Address.

- 20 Dec., Geological Notes in Kerry—J. St. J. Phillips.
 „ Some Notes on the Fauna of Kerry—R. Welch.
 „ Antiquarian Notes from Kerry—F. J. Bigger, Vice Pres.
 17 Jan., Irish Butterflies—Rev. W. F. Johnston, M.A.
 „ Notes on New England Butterflies during 1896—Geo. Donaldson.
 21 Feb., *Whales*—The significance of their structure and development in connection with theories as to their origin—Prof. Symington, F.R.S.E.
 21 Mar., Report of Delegate to British Association—William Gray, M.R.I.A.
 25 Apr., The General Meeting.
 „ British Ferns—W. H. Phillips.

A Science Gossip Half-hour has been inaugurated on the evening of each meeting with a view to encourage intercourse and discussion on topics of interest to the Field Club. Members are strongly urged to bring forward new specimens or objects on which they may desire information in an informal way.

As well as the above meetings a number of meetings have been held by the Botanical and Geological Sections. These meetings are open to Members of the Club who desire to pursue a systematic course of study in these departments. The reports from these sections will be found in the report of Annual Meeting.

Collections have been received in the Prize Competitions as follows:—

Collection of Land and Fresh Water Shells, by Mr. H. L. Orr.

Collection of Flowering Plants by Miss Finlay.

Collection of Plants by Mr. Adams.

Miss Finlay and Mr. Orr took the Club's Prizes for their respective collections, and Mr. Adams' collection received honourable mention.

In Mr. H. L. Orr's carefully named and very nicely mounted collection there were 52 species (with 7 varieties) represented; including rather more than half of those known to occur in the North-East of Ireland, and among other rare or local shells, *Sphaerium lacustre*, the first specimens found in Ulster; *Acme lineata*, an unusually nice set from two new stations in Down

and Antrim ; *Helix lamellata*, *Vertigo antivertigo*, and *Planorbis crista* with its Var. *Nautilus*, a number of the latter are very interesting scalariform.

The thanks of the Club are due to the Railway Companies for facilities of travel, the Press for their lengthened reports of Meetings and Excursions, and those members who contributed to the success of Excursions and Meetings by acting as Lecturers.

J. ST. J. PHILLIPS,
W. D. DONNAN,
Hon. Secs.

THE TREASURER IN ACCOUNT WITH THE BELFAST NATURALISTS' FIELD CLUB.

Dr.

Income and Expenditure for the Year ending March 31, 1899.

£t.

To Subscriptions	..	£87 10 0	By Balance from last Account	...	£2 5 9
„ Entrance Fees	...	6 0 0	„ Printing Proceedings	...	11 10 6
„ Tickets Conversazione	...	13 4 0	„ Stationery, Printing, &c.	...	16 2 7
„ Sale of Flora	...	0 3 11	„ Expenses of Conversazione	...	14 1 8
„ Sale of Proceedings	...	1 11 0	„ Rent, Museum	...	11 6 0
„ Sale of Lists	...	0 7 0	„ Loss on Excursions	...	0 1 5
			„ Botanical Section	...	2 0 0
			„ Commission to Collector	...	3 0 0
			„ Donation, <i>Irish Naturalist</i>	...	2 0 0
			„ Donation, Irish Field Club	...	2 2 0
			„ Expenses of Lectures, &c.	...	2 9 0
			„ Postages	...	19 1 0
			„ Gas	...	1 13 5
			„ Delegate's Expenses	...	1 0 0
			„ Prizes	...	0 15 0
			„ Incidentals	...	0 11 0
			„ Balance	...	18 16 7
		£108 15 11			£108 15 11

W. H. PHILLIPS, Treasurer.

PROCEEDINGS.

SUMMER PROGRAMME.

FIELD MEETINGS.

28 *May.*

ANTRIM TO LARNE.

The first field meeting and exploring expedition for the season occurred on Saturday, the 28th May.

The course selected was from Antrim to Larne, along the right slope of the Sixmilewater Valley and the left slope of the Larne water or Invir. This district runs almost parallel to the Northern Counties Railway, yet it is little known to the majority of Belfast people. It is a district of the greatest interest to the geologist, the antiquarian, the politician, and the agriculturist. Some of the most striking events of our past history occurred here, and many of the leaders of our modern enterprise and progress came from this locality. Our party reached Antrim by the Northern Counties Railway, and at once proceeded to pay their respects to the Round Tower of Antrim, by permission of Mr. Clark, whose late father was always interested in the Club's work, and cheerfully made them welcome to the steeple and its grounds. At Antrim we were met by Rev. Mr. Smith, a gentleman who has made a study of the antiquities and natural history of this locality. From the base of the tower Mr. Smith gave a full description of this tower and other local antiquities, and promptly replied to the volley of questions put to him by the members of the party anxious to know—the date

of the erection of the tower ? was the cross over the door of the same date as this tower, &c., &c. After Mr. Smith's address the party were conducted over the grounds and garden by Mr. Clark's gardener. The great bullan-stone in this garden gave rise to an animated discussion, and the difference between it and the cup-marked stone was considered. Vehicles were in readiness to convey the party to Larne, a distance of twenty-one miles. They were provided by Mr. H. M'Neill, of Larne, whose ready resources, tact, and courtesy are invaluable to the exploring naturalist, the ordinary visitor, or the holiday-seeker. Comfortably seated on M'Neill's well-appointed machines, we drove through Antrim and along through a most prosperous agricultural district, pregnant with thrilling memories of the sad events that took place all over our course just a hundred years ago, memories our party did not care to awaken, while they noted the fact that for the entire of their drive they traced the ironbeds that occur between the upper and lower basaltic rocks of Antrim. This zone marks a very distinct horizon of the greatest geological importance, and it is from this the iron-ore and bauxite industries have sprung. The zone was first exposed at Ballypallady during the construction of the Northern Counties Railway, when the late Dr. Ritchie noted its economic value, and originated an industry that has been carried on with more or less success ever since. Subsequent to the discovery of the iron-ore beds the associated bauxite or aluminous clay was discovered at Glenarm, and since then it has been discovered in several other places in County Antrim, and is now converted into the metallic form, a factory for its preparation being at Larne. Distinctive sections of this zone can be seen from the railway near Ballypallady, and a most interesting section is exposed near Templepatrick Station, where the chalk occurs at the surface, and connected with it a protrusion of rhyolite, a peculiar form of volcanic rock only occurring in a few places in Antrim and Down, and in every case indicating a volcanic outburst that took place prior to the date of the upper basalts.

The district we explored is still rich in antiquarian remains, although within living memory very many may have been deliberately destroyed. It behoves all who are interested in Irish Antiquities to do what they can to carefully maintain all the monuments that are left.

Perhaps there is no part of Ireland, and therefore in no part of the British Isles or elsewhere, where there are so many souterrains, or underground dwellings, as in the district we refer to. Almost every rath or fort has one attached, and many more occur disconnected from any other form of ancient structure. They are as a rule constructed of field stones or such other kind of stones as can be had in the locality ; but many of those in the Valley of the Sixmilewater are excavated out of the volcanic ash or decomposed basalt that occurs in the district. The one at Rathmore, as well as the one at Donegore, are so constructed. The plans of all souterrains are very much alike, and consist mainly of a passage four or five feet wide and six or more high, off which branch chambers six to eight feet wide, and up to twenty feet long, and seven or eight feet high. The entrance to the chambers from the main passage are reduced to openings, two feet square, or even less, and often similarly constructed openings occur in the main passage. Similar so-called "dwellings" occur in Cornwall and in Scotland ; in the latter place they are called Picts' houses, or weems. In both countries, as with us, they have excited various speculations as to their real use. Dr. Hill Burton, in his History of Scotland, says, with reference to them—"If we adopt what is said by Ptolemy and other ancient geographers, and in some measure sanctioned by modern travellers, about a troglodytic or cavern-living population in Arabia, we may suppose that we have here the actual dwellings occupied by a race of like habits at the opposite extremity of the globe." In the district we traversed these souterrians are called "coves."

Our party paid a visit to Rathmore, which is an excellent example of the ancient Irish fort. From its rath or mound a magnificent view of the surrounding country was obtained, a

fact that demonstrated the strategic skill of the original builder, in selecting such a commanding site for the residence of the local chief. One of our party gave a description of the fort, and referred to some events of its history. The current number of the "Ulster Journal of Archæology" furnishes most interesting descriptive details relating to this monument.

The next halt was below Donegore, and the whole party successfully stormed the fort, and were more than rewarded by the extensive view from the top, from which we could see the hills and valleys of Lower Antrim, Lough Neagh, Counties Down, Derry, Tyrone, &c.

In a well-cultivated flower garden, brilliant with bloom, on the slope under the fort, there is a very good example of the excavated souterrains. The proprietor of the premises invited the party to see it, and the information he gave enhanced the pleasure of the party.

Proceeding to Parkgate, a survey was made of the site on which once stood a very complete stone circle; a description of the circle was given by one of the party who made a sketch of it some years ago. Since then the circle and the plantation around it were completely removed in the progress of agricultural improvements, an event to be recorded with regret. Passing through the village of Doagh, we soon reached Ballyclare, where a halt of 20 minutes was made, the time being utilised by inspecting the antiquarian and natural history collection of Mr. Baird, whose hospitality at this stage of our journey was no less acceptable.

Sharp to time the advance to Ballynure was called, and thence to Ballyboley, or the Hill of Grief. On the slope of the hill we visited one of the few Northern monuments connected with recorded events. The monument is in the form of a kistvein or stone box, and is supposed to be the burial-place of the Irish King Tuathal Teachtmhar, who, according to the annalist Tighernach, was slain by Mat MacRochraidhe, King of Ulster, at Linn an-ga-gabunn in Dalaradia. This event took place A.D. 106. It may, however, be the grave of another King, Fothadh

Airgtheach, who, according to the annals of the Four Masters, was slain near this A.D. 206. The supposed erection of this monument is referred to in one of the oldest of our ancient Irish manuscripts. The Rev. James O'Laverty, P.P., of Holywood, has exhausted all sources of information on this point, and gives the substance of the result in vol. 3 of his well-known work on the Diocese of Down and Connor, a work well worth consulting for information regarding the district we have traversed.

After spending a most enjoyable day in this most interesting locality, we reached Larne in time for tea before leaving for Belfast, which we reached about eight o'clock.

14 June.

MELLIFONT.

The second excursion of the season took place on the 11th, when a goodly number of members and their friends, started by the 7-30 a.m. train of the Great Northern Railway for Drogheda, *en route* for New Grange, Monasterboice, and Mellifont, on what might fairly be termed a purely archæological trip, and several members joined the party on the way down and at Drogheda. That a Field Club should embrace archæology is to some a strange and debatable point, but the practical results which this "section" has to show, fully justifies the Club in taking it under its wing, and the success of this trip with its numerous and varied investigations, completely banished any "debatable point" that may have lingered in the minds of any of those present.

The day was as nearly perfect as could be desired, a fortune almost invariably attending the Field Club outings. It was, as Washington Irving says, "One of those genial days when we seem to draw in pleasure with the very air we breathe, and to feel happy, we know not why." Arriving in Drogheda, no time was lost in starting in the waggonettes, which were

waiting, and provided by the proprietors of the White Horse Hotel, and proceeding through the quaint city full of old-time memories, the party went briskly forward along the valley of the Boyne, keeping to "King William's" side of the river, until the site of the famous battle was reached, where the party dismounted to visit the obelisk which marks the site, commemorates the victory, and records the death of William's great General. The points of local interest were shown and discussed, and many were the questions asked, and the intelligent drivers allowed no point of local topography to escape attention. No sooner had the excursion started from Belfast than one of the genial features of the Club became apparent in the friendly desire of those who knew the country to point out and explain the localities passed through, their physical condition, and the history that has made many of them famous. No item seems too small or insignificant, for some specialist takes it, and describing it, clothes it with a charm, that, taking root, has been the beginning of many a study that has not infrequently produced a specialist of no mean worth.

Continuing the drive along the Valley of the Boyne, winding in and out of the river, the great charm of the summer fullness, the gladness of the "leafy month of June," became apparent in the constant changing landscape beauties of one of the most magnificent valleys of Ireland, and many and constant were the expressions of delight called forth by the great panorama, as it untold its naturally-coloured pictures. One of the great attractions was the unusual profusion of wild flowers that seemed never ending. The once snowy hawthorn, now blushing faintly before its fall, followed fast on by the golden yellow clusters of the laburnum, which seemed to be luxuriously at home, to say nothing of the climbing roses that gable-end after gable-end supported, and the flowing masses of the rhododendrons, all in the rich setting of colours, that make a summer perfect.

Arriving at the Hill of Dowth another halt was made to inspect the sepulchral chambers of which this mound seems to

be full. These, from a constructive point of view, are much the same as New Grange, to which the party next proceeded, but although not so important, should on no account be omitted from a tour of inspection. Arriving at New Grange, a third halt was made, and a close inspection at once commenced of one of the most important parts of the day's work. Assembling at the base of the conical hill—where the entrance to the chambers is situated—a brief description of the “Royal Cemetery” of a forgotten race was given, and attention directed to the chief points to notice. Candles were then lighted, and the long tunnel entered. This is about seventy feet long, and admits of almost upright walking until the centre is reached, where owing to a depression it is necessary to creep for about two yards, but no difficulty was experienced by any of the party. At the extremity of the tunnel a circular chamber was reached, off which are three minor ones forming a rude cross on plan, but this is purely accidental. The centre chamber is about fourteen feet diameter, and rises to eighteen feet to the crown of the dome. Attention was called to the great monolithic character of the dry masonry, and above all the rude attempts at ornament, chiefly incised, but some few in relief, and which constitute, perhaps, the earliest attempt at decoration that Ireland ever saw; and before the day was finished attention was again called to the unrivalled perfection to which Irish ornament ultimately expanded. When the entire party had assembled in the central chamber, blue lights were burned in order that the full extent and effect might be observed. The entire mound, covering about an acre, and rising to nearly fifty feet, is artificial; and Wakeman, writing in 1848, says, “It would be in vain to speculate on the age of a work situate on the Boyne, which, if found on the banks of the Nile, would be styled a pyramid, and perhaps be considered the oldest of all the pyramids of Egypt.” The circular base is guarded by a ring of great standing stones, memorials, no doubt, to the leaders of a race who had great ideas, and whose works, if primitive and uncultured, are of such importance that the

nation has now taken charge of them to preserve them. Having completed the investigations, the secretary's whistle called all together again, and a start was made for Mellifont, driving through the grounds of Townley Hall, whose "living gallery of aged trees" formed still another of a numerous series of pictures, whose number in this excursion seemed to be without end. A halt of over an hour was made at Mellifont for lunch, and the inspection of the remains of the grand Cistercian Monastery, the premier one of Ireland. It is hardly necessary to attempt a description here of this well-known establishment, which the party closely inspected, and which various members explained in detail. Here some of the younger members, the architects of the future, at once set to work to sketch and measure details with commendable industry that gained for them some well merited praise. Once again on the march the party pushed on for Monasterboice, where much time was spent, and where much more could have profitably been spent, in the study of the fine old crosses, the gems of Irish art, some of the richest treasures left to us by the early Christian Church in Ireland. Here was seen the exquisite perfection of the Celtic ornament, the peculiar character of its graceful lines, the gentle swelling to high relief, and the soft receding wave-like forms that go to create the delicate spiral beauties known, as Sir Frederick Leighton said, "by the blaring name of the trumpet pattern." The iconography caused many conjectures, and were as satisfactory as usual. The base of the highest of these crosses was never finished, and the shaft suffered severely from "The Bigots of the Iron Time," as Sir W. Scott styles Cromwell's iconoclastic zealots, and the equally reprehensible action of modern zealots has caused the Board of Works to attempt a means of preservation by railing them in. Most of the party ascended the round Tower, which now reaches the height of 90 feet, and which has been refloored and laddered by the Board of Works. Time was now pressing, and a quick run was made to Drogheda, which was reached at 5-30 p.m. Alighting at the White Horse Hotel, the party was

met by the courteous and hospitable landlord, who had dinner ready to serve, and soon the party were doing justice to a well-served and well-earned repast. At 6-20 the excursionists entered their specially-reserved carriages on the Great Northern line, and a quick run brought all safely home by nine o'clock, and thus terminated a most enjoyable and instructive trip. In conclusion, we might observe that many of the archæologists seemed to be equally at home in geology, botany, and other subjects fostered by the Field Club, and in each branch a keen look out was kept, with results that will be forthcoming later on. It will thus be seen that the day's primary object in no way overshadowed other studies.

CARLINGFORD.

A promising Field Meeting was arranged to be held at Carlingford on the 24th and 25th June with the intention of exploring the surrounding district which is of special interest to the Naturalist, Geologist, and Antiquarian. Unfortunately the morning of the 24th and several days previous were so dreadfully wet, only a few members turned out, half the number being ladies.

The first day was spent at Rostrevor, from which the party visited Clochmore and the surrounding hills, and in the evening had a Bat-hunting expedition by the river side in the valley.

The next day the party crossed the harbour and took rail to Carlingford, where the mountain, quarries, ancient Castles, and many other places of historic interest were explored.

The result of the expedition under such unfavourable conditions encouraged the hope that the conductor's arrangements and expectations may be more successfully realized on a future occasion.

KENMARE.

The second triennial Conference and Excursion of the Irish Field Club Union, took place at Kenmare, and occupied from the 7th to the 13th July.

This re-union was in every way most successful, and important results followed, of which full particulars are given in the report published in the *Irish Naturalist*, Vol. VII., No. 9, September, 1898.

30 July.

BARNEY'S POINT.

It will be admitted that there is not much poetry in the above title, and yet it is sufficient to excite the imagination of the thoughtful naturalist and to call forth images of interesting scenes and strange forms of animals and plants that millions of years ago flourished in our locality. Barney's Point is not an argumentative idea; it is a positive reality, a place, the happy hunting ground of geologists for many years.

The first field meeting of the Belfast Naturalists' Field Club was held here more than thirty-five years ago! Until then Barney's Point was scarcely known: since then it has been frequently visited, and always with interest. We paid our first visit in 1863, going by Ballycarry Station, and as our party of over eighty members and friends walked from Ballycarry to Barney's Point a gentleman who resided on Islandmagee met us, and, recognising one of our party—a friend of his—asked where such a lot of people were going. His friend replied, "We are going to the Lias." "The Lias!" he exclaimed. Why, I know Islandmagee well, and I assure you there is no such place as the Lias, so there must be some mistake." His interest, however, was at once secured when our conductor explained that our object was to visit and explore an outcrop of the Liassic geological formation that occurred at that portion of Island-

magee called "Barney's Point," on the east shore of Larne Lough. Last week the Field Club's fifth excursion for the year was to Barney's Point. We went by Magheramorne, and, crossing the lough by the ferry, reached Millbay, from which Barney's Point is but a short walk.

As it was low water when we arrived, the outcrop of the Lias was very fully exposed.

Our investigations were not confined to the Lias, and therefore of the members of our party some took to botany and some to entomology, but our meeting was mainly for geology, for which this point is so well adapted.

Standing at Barney's Point and looking over the lough to Magheramorne, we can see a very excellent section of our Northern rocks forming the face of the limestone quarry at Magheramorne, where it is worked for economic purposes.

Below the cultivated soil of the surface we see a considerable deposit of boulder clay, which tells of the severity and changes of the glacial period. Below this we have the dark basaltic rocks, which is the record of a long-continued period of violent volcanic eruptions, during which many of the hills of Antrim, Scotland, and the Continent were formed. Below this we have the white limestone or chalk and the greensand, the former a deep-sea and the latter a more or less shallow-water deposit. Going back in time, as we descend in the formations we come to a great break in geological time, for we find the upper green-sand rests on the lower lias, so that the middle and lower green-sand with all the oolite series, and the upper and middle lias beds are entirely absent. These absent beds comprise a series of rocks several thousand feet thick, including the Bath and Portland oolites, the Oxford, Kimmeridge, and Bradford clays, &c.

We are only left the representation of the 'lowest liassic' beds, and they rest upon the new red sandstone series, which forms the slopes of the hills about Belfast at the Antrim side. The lias does not occur elsewhere in Ireland. If we can now imagine that the boulder clay, the basaltic rocks, and the sheet of chalk or limestone covering County Antrim were entirely removed,

we would then have exposed the blue limestone, shales, and clays deposited during the liassic age, which at that time was in the form of marine mud, and the numerous fossil contents which we now find in the blue limestones, shales, and clays indicate the nature of the animals and plants that flourished during the liassic period. Nay, more; Barney's Point as we now find it is fairly typical of the physical conditions that prevailed in liassic times. We find ourselves on the shore of a lake or lagoon, with clay banks and a muddy shore, and scattered over the surface there is a multitude of animal remains, once living creatures, now fossil petrifications, yet wonderfully suggestive of the condition of life in liassic times. Walking over the surface, we pick up numerous fragments of ammonites, that strange nautiloid form of cephalopods that swarmed in and about Larne Lough in liassic times. There were several hundred species then living, but they have all died out, as well as their immediate relatives the belemnites. So characteristic were the ammonites of the lias, certain species became typical of each zone. Thus the stratigraphical position of the exposure at Barney's Point is known as the *ammonites angulatus* zone.

Mixed up with the numerous fragments of ammonites, the rarer belemnites, and many other extinct species, we find at Barney's Point some minute but beautiful five-rayed stars. Indeed, they were when living closely allied to the well-known starfish, but unlike the free modern representative, the Pentacrinite of the Lias was fixed, its solid stem, branches, and arrus-like bushy plants covered the sea bottom in tangled groups. Now the separated plants of which the stems were composed may be found in the fine beach gravel or petrified with numerous other marine forms in the fragments of blue limestone scattered about Barney's Point. These fragments have been washed out of the adjoining bank by the action of the waves, and are made up of fossil organisms.

Continuing our search, we found that the cidaris, a very remote ancestor of the modern sea urchin, was represented by separate plates and spines loose in the gravel or petrified with

other forms in the bands or fragments of limestone, and so distinct were they that a polished slab displayed the ornamental structure of the spines, with a definition as clear as the microscopic section of a recent species. Had we really walked over the seashore of liassic times we could not have collected more perfect examples of pectens, and oysters, and astartes, cardinas, and the numerous other species we collected at Barney's Point. Many of the shells were crushed, and some had the valves shifted or altogether separated. What crushed or shifted the shells was not indicated, but the record was clearly preserved in the petrified specimens we found, and we may assume that the damage was wrought by some great saurian that we have reason to believe paddled over the shallow waters of the liassic shore. We did not find any of their bones at Barney's Point, but such bones have been collected at other places in County Antrim, particularly in the lias outcrops along the Antrim coast road.

Laden with fossils and other specimens, we left Barney's Point, pondering over the vast changes that have taken place in the climatic conditions, the bold physical features, and the prevailing organic life of the successive geological ages since the beds we explored were laid down.

Approaching Millbay our attention was arrested by a most brilliant sunset over the hills of Antrim. This scene we continued to enjoy, with musical voices of fellow-passengers, as we crossed the calm waters of the lough. Thus our thoughts were raised from the contemplation of material changes, decay, and death up to the permanence and grandeur of the heavens.

28 *August.*

KILLOUGH AND ST. JOHN'S POINT.

The sixth field meeting for the season was held at Killough on Saturday, 20th August, and the district was explored in search of such subjects of interest as usually engage the

attention of the members. A party of twenty turned out, and on arrival were welcomed by the local authorities, including the R.I.C., who, with full knowledge of our object, wished us every success.

Passing through the almost deserted street of this healthy and most attractive seaport, we at once struck off by a footpath through the fields, where, hammers, nets, bottles, boxes, and other collecting apparatus being unlimbered, an active day's work commenced.

A detachment plunged into the White Bog, while the main body took the direct road for St. John's Point. On the way thither a halt was made at a wayside holy well, which is said to be dedicated to St. John, and a stone is shown with the impression of the saint's knee. A sacred tree also casts its shadow over the well, but there is nothing in the form of votive offerings or other indications of the ceremonials that no doubt took place here in former times, in common with similar remains so widely distributed throughout Ireland, the remains or survival of a cult that prevailed from the Western Islands to the mountains of India. Passing on to the old Church of Saint John, we come to another holy well, once held in very high esteem, but which is now in a most disgraceful condition. The well is dry and neglected, save only by some roughs who have blocked the well with a large stone once known and venerated as "the wishing stone." This stone has a natural hollow on its surface, and it was supposed that this hollow was worn by the knees of the faithful who in early times paid their devotions at the well. The printer's devil seems to have knocked the sentiment out of most of our Northern holy wells ; at all events, some evil spirit must have possessed the vandals who wantonly destroyed this well. Standing around it on Saturday, the Field Club passed the following resolution :—
"We deeply regret to find the wishing stone at St. John's Well removed from its old position and thrown into the well. Such mischievous and improper conduct merits the strongest public condemnation. Every effort should now be made to remove

the stone and restore it to its former position. This undertaking will have the warmest sympathy of the Club."

Leaving the holy well, we next explored the adjoining ruins of St. John's Church. This is one of the most interesting examples of ancient church architecture in the North of Ireland, possessing features that do not occur elsewhere in Antrim or Down. Of its early history very little is known, and nothing of its origin. It is one of the small primitive type, measuring inside 20ft. x 13ft. It has no chancel, and had only two small windows. Part of the side window remains, but the east window, with its gable, is gone. The side walls project beyond the west front. This is a peculiarity of the early churches erected from the sixth to the ninth century. The ancient minor temples of Greece built "in antis" had the side walls prolonged, and two columns between formed the entrance porch. Hence such projections in our early churches are called "antæ." Subsequently in Christian architecture they were developed into the well-known "buttress." The entrance doorway of the church also indicates its primitive character. The opening is only 6ft. high, with sloping jambs 2ft 3in. apart at the horizontal head, and 2ft. 9in. at the foot.

This is probably the Church of Stechian granted to the Abbey of St. Patrick by Malachi, Bishop of Down, about the year 1183. In the taxation of Pope Nicholas, A.D. 1291, it is called "Capella de Styoun." The late Bishop Reeves suggests that Styoun was derived from "Tigh Eoin," which means John's House. St. John seems to have been the patron saint of the district.

Not far from the venerable Church of St. John we came to St. John's Point and its excellent lighthouse. St. John's Point forms the north-eastern horn of the great Bay of Dundrum, the south-eastern horn being Dunmore Head, a distance of ten miles across, the great donjon and fortress of Dundrum occupying the centre of the bay four miles inwards from the chord of the arc. The entire sweep of this bay, once known as "the Holy Bay," can be seen from St. John's Point, with

Newcastle in the distance nestling at the foot of Slieve Donard, of the Mourne range, which rises nearly 3,000 feet above it.

There is a well marked difference between the surface geology of this bay south of St. John's Point and the surface geology of the shore to the north of St. John's Point to Killough. The Bay of Dundrum has for the most part a flat sandy shore backed by extensive sand dunes which extend for a distance of six miles around the shore, and at low water great stretches of flat sandy surfaces are exposed ; whereas from St. John's Point to Killough the shore is composed of the serrated edges of tilted rocks in the wildest confusion and of the grandest aspect, the result of volcanic forces that operated ages ago upon elementary rocks, several thousands of feet thick, once horizontal layers, but now tilted up on edge, so that the geologist can read the marvellous records indicated by the exposed strata. Here are thin layers of fine strata laid down in deep still water ; here are the rougher grits of ancient shore lines, and their upturned edges are now cut through in all directions by varied forms of once-molten volcanic matter that now stand out as dykes throughout the district. A rich variety of rock specimens was secured here, and our marine zoologists made good use of the favourable opportunity afforded them in the rents, fissures, and rock pools that abound along this sea-beaten coast, where, in an apparent wilderness of geological confusion, the earnest naturalist can detect even the minute forms of organic life. One member provided with waterproof sea-boots waded into the rock pools, and his captures were considered most satisfactory. Many of the pools below high water were found well stocked with an abundance of interesting forms. The ridged periwinkle that assumes such a variety of colours was found very numerous, and some four species of isopods, with a great variety of other forms, were collected. Coming towards the land, *Helix nemoralis*, a thin form, was taken close to the beach. Farther inland *Vertigo antwertigo* and two other species of vertigo were found in abundance around the flax pools, with *Aplexa hypnorum* and *Planorbis spirorbis*, &c.

Coming near to Killough we noted the raised beach and the upper accumulation of crass gravel which Harris, writing 150 years ago, called "unripe sandstone." This tertiary deposit of calcareous matter occurs along the shore from Killough by Ardglass to the beach at Ballyhornan, some distance beyond Gunn's Island. It is a pervious deposit, and is no doubt the source of the water supply to the wells along the coast, as at Killough, where it rests upon the impervious rocks, and thus holds the water that supplies St. Seordin's Well, from which the supply for the town is derived. This bed of calcareous conglomerate may be called "the mother of Seordin," a term that is sometimes applied to the smaller wells along the coast below the Coastguard Station.

Killough, presenting such a variety of physical conditions, is known as a highly interesting district for the botanist, yielding a number of plants of much rarity, and a wide range of the more general forms. The result of our visit was therefore quite satisfactory. On the coast the following were collected:—The pretty blue skullcap (*scutellaria galericulata*), knotted pearl-wort (*sagina nodosa*), the lesser swine cress (*senebiera didyma*), the white centaury, &c. On the roadside, near the well, the dwarf elder, or Dane's blood, was found; also one of our rarest rushes, *juncus obtusiflorus*. The wild beet (*beta maritima*) occurs near Killough Station. This species is the origin of the cultivated beet. The wild chicory (*cichorium intybus*) was found in a grazing field near the town. The root of this is the chicory of commerce; it is cultivated in England and the Continent, and may be supposed to have been introduced here; if so, it now appears to be quite naturalised. The principal discovery of the day was the samphire (*crithmum maritimum*). This is the St. Peter's herb of Italy (*herba di San Pietro*), from which our name is derived. Old Gerard says that, "mixed with vinegar and oil, it stirreth up an appetite to meate," hence there was a trade in its collection and preparation. To this Shakspeare refers in connection with Dover Cliffs—

“ . . . Half-way down

Hangs one that gathers samphire; dreadful trade!”

One sample was collected near St. John's Point, where we hope it will be preserved, and not exterminated.

When the “Flora of North-East Ireland” was published, the samphire was not known nearer than County Donegal; now we have the record of three stations resulting from researches of members of the Belfast Naturalists' Field Club. Our next business was to partake of a comfortable and refreshing tea, provided for us at the Bangor Arms, Killough, and then the work of the day was reviewed and new members elected, which closed our field meeting before we came to Belfast.

HOLYMOUNT.

10th September.

On Saturday, 10th September, the final excursion of the session took place, the hunting-ground selected being the demesne of Holymount, near Downpatrick. A bright, cheery day—as perfect as September could produce—brought together a goodly number of members, representing all the various sections of the Club, and, although the primary object of the day was purely botanical, advantage was taken of the opportunity to work in other subjects equally deserving of attention. Arriving in Downpatrick, the party was joined by other members, and without loss of time the greater portion started in well-appointed waggonettes for the happy hunting-grounds, while another section of archæological taste set off in the opposite direction, as a countryman observed—“in search of iniquities.” Both parties, comparing notes in the evening, were loud in praise of their respective drives, the well-kept roads, the rich scenery, the inspiring freshness of the day, with all the gladsome charm of autumn's golden clusters, which, in field beyond field, in picture after picture, presented the evidence of the greatest blessing a country can receive—an abundant harvest. The main division of the party set out

for Holymount demesne, the chief object of the excursion being to explore the extensive woods which lie behind and around the manor house. These woods have never been visited by the Club, nor, indeed, by any of our local naturalists, and the members eagerly looked forward to establishing some new records. A drive of two miles brought the party to the entrance of the demesne, and another mile up the long avenue revealed the house itself—a solid-looking structure, bearing marks of decay, but prettily set in a background of fine trees. Holymount House is of considerable antiquity, and once belonged to the Cromwell Princes, Lords of Ardglass. It now belongs to Mr. D. G. McCammon, whose courteous permission enabled the Club to wander all over the estate. A narrow lane brought the members out to the marshes, which fringe the demesne. There some of the more ardent botanists and conchologists boldly plunged out in search of treasures, whilst the majority preferred to skirt along the edge of the wood, enjoying the blackberries, which were just at their best. The site of some ruined cottages perched on a slight eminence offered a tempting place for a halt, and here a frugal lunch was partaken, washed down by water obtained from an adjacent cottage. An energetic member photographed the luncheon party, and also “snapped” an aged pedlar who was passing, much to the latter’s dismay. Retracing their steps, the stragglers were picked up, and the united party entered the woods, and wound their way round in a circle. The undergrowth here was very thick, but a sort of path had been cleared, which made progression fairly easy, only a few of the more energetic naturalists deviating from the path in search of treasures.

Holymount House was again reached after an absence of a few hours, and the members walked down the drive to inspect. Ballydugan Lake—a small piece of water which lies nearly opposite to the entrance of the demesne. A fresh breeze blowing over the surface of these waters was very grateful after the sultry atmosphere of the woods. A few fresh-water shells were collected at the lake margin, but little else was observed,

although if time had permitted some tempting marshy ground at the southern end of the lake might have yielded some results.

A discussion on the results of the day showed that some of the finds had not been so interesting as had been expected. The botanists had noted the marsh-violet (*hottonia palustris*) in the drains at Holymount, the small knot-weed (*polygonum minus*), and the least marsh-wort (*apium inundatum*) in the marshes; whilst in the woods the guelder rose (*viburnum opulus*) in berry formed a pretty sight. The coleopterists were disappointed in the small number of forms noted, none of the longicornia being met with. A fair number of land shells were obtained in the marshes and in Ballydugan Lake. A prize had been offered at the beginning of the day for the largest collection of botanical specimens. The president (Rev. C. H. Waddell, B.D.) acted as judge, and it was announced that Miss Finlay was the winner with 87 specimens, the other competitors being Mrs. Stephens, 56 specimens; Miss Alice Tate, 53 specimens; and Miss Walker, 48 specimens.

The minor party wound their way southward, and soon leaving the main road, followed the less beaten tracks of the country by-ways, pulling up at length by the quaint little parish church of Ballee. There is nothing very ancient about it, but its internal arrangements are of a type that is fast passing away and now seldom if ever seen—old square pews, irreverently called “loose-boxes,” and the old-fashioned double-decker pulpit placed at the centre of the side wall. The graveyard possesses but few stones of much interest, but in one corner is an old “resurrection” house now converted into a vault, since, happily, it is no longer required, as the profession of “body-snatchers” has become extinct. From this the party travelled on to Bright—a townland situated on a most commanding height—that gave a bird’s-eye view from the old church of St. Nicholas at Artale round the coast to Newcastle and the Mourne Mountains, whose magnificent unclouded outlines and deep purple colour formed a fitting background to one of nature’s never-tiring pictures. Here the rector of the parish (Rev. G. Beere)


met and conducted the party to the various points of interest. The church of Bright stands on a rocky bluff, whose formation seems to give rise to a theory that it is the site of an ancient fortified settlement, but a close inspection did not impress this theory on the minds of the visitors. This site was dominated by an old castle—one of the De Courceys—of which only the east wall and small portions of the sides are left, and contain little or nothing in the way of attractive detail. From here a run was made eastward to Ballynoe, and, leaving the cars to follow the roads, a march across the fields was made to visit a stone circle—one of the most perfect in the county and of special interest, as it appears to have had three concentric rings of stone, the middle one being in a remarkably fine state of preservation. Situated as it is so far from the beaten track, it is seldom seen and little known, but it well repays a visit to those who care to study these land-marks of far distant ages. Continuing the march across richly-laden fields, busy with harvest labour, a brief inspection was made of the commanding and perfect dun of Screen, and then a fruitless search was made for the ancient church, but it has probably been “translated” into farm offices like many others of like nature. Once more getting on the cars a quick drive brought the party back to Downpatrick, where, joining the former party, all repaired to the Down Hunt Hotel to a most welcome and well-earned repast. There was still some little time left, and visits were made by some to see the great Royal Dun, or rath, on the north side of the city, which, from its peculiar site and colossal dimensions, is ever strangely attractive. The old cathedral was also visited, as it possesses a new feature in the chancel window, which has been filled in with stained glass of masterly and harmonising colours. The new stonework of the window is not seen from the inside, or we should say it is lost by the attractive power of the glass, but when viewed from the exterior we regret that another treatment was not adopted. Lastly, the high cross of Downpatrick received a share of attention, and perhaps with some degree of justifiable gratification by the

members of the Field Club who had assisted in its restoration. Thus ended a most successful series of excursions, the results of which are being steadily worked out by the members of the Club with confidence of producing a record for the year at least equal to any previous one.

An interesting feature of the years programme was the series of field lectures—short descriptive accounts of the scenery, geological features of the landscape, and objects of archaeological interest which was given by William Gray, M.R.I.A. These lecture which were often given in some romantic spot while lunch was proceeding were much appreciated, and added greatly to the instructiveness of the excursions.

WINTER SESSION.

CONVERSAZIONE.

N the 2nd November, the Winter Session of the Club was entered into in an agreeable and appropriate manner by a conversazione in the Free Library. The various rooms were made use of to the best advantage, and looked extremely handsome.

Tea was served in the newsroom from tables ranged along two sides of the walls, some of the lady members acting as tea-makers. After leaving the tearoom the members were directed to the exhibits in the Grainger Room, where Robert Bell had a collection of fossil sponges on exhibit. H. L. Orr exhibited a choice collection of land and fresh-water shells; some live lizards which he exhibited attracted attention. Round another table in this room excitement ran high over John Hamilton's toads and slow-worms, which proved interesting to all. Many members visited the Art Galleries, where the pictures of the Art Society were on exhibition. Ultimately the members gathered in to the reference library, which was admirably laid out for the various displays. Tables were arranged along the ambulatory round the room, leaving the large central space free for a lantern exhibit. At the left of the entrance door Robert Welch displayed a large collection of shells collected this summer in County Kerry, as well as living specimens of the Kerry Slug, which he explained was found only in Kerry and Portugal. On the same table the Hon. R. E. Dillon had a fine collection of lepidoptera exhibiting protective mimicry. These moths and butterflies were beautifully mounted with small portions of their habitats, which showed how closely the colour or shape of each approached that of its natural home, and it was easy to imagine how much such similarities would contribute to their safety and render them obscure to their

enemies. On the same table G. P. Farran, of the Dublin Field Club, exhibited a collection of shells from shell pockets in West Donegal, and F. J. Bigger exhibited some living helices collected from the Grand Canal, Venice. Arranged on large screens at one end of the room was a large collection of photographs taken in Kerry by R. Welch, his studies of plants being particularly fine. On the next screen Rev. C. H. Waddell, B.D. (president of the club) exhibited a collection of Irish brambles illustrating the many varieties that may be found. Close to this was a collection of mounted algæ or seaweeds from the Antrim coast, exhibited by H. Hanna, B.Sc.. The next table was devoted to microscopy, and was well attended, little groups gathering round each exhibitor to hear the many excellent demonstrations that were in progress during the whole of the evening. Professor W. H. Thompson, M.D., had elaborate apparatus to record muscular contractions, giving a full demonstration on the object selected. Professor Lorrain Smith, M.D., showed the bacilli of diphtheria anthrax, and tuberculosis. W. D. Donnan, M.D., exhibited living specimens of melicerta and floscularia; Cecil Shaw, M.D., nerve cells; John Tennant, M.B., the plasmodium of malarial fever. Miss M. K. Andrews exhibited sections of Auvergne trachytes and rhyolites from various localities in Antrim, showing also the rocks from which the slides were cut. As is usual, the exhibits of Joseph Wright, F.G.S., attracted much attention. This year he showed a large collection of foraminifera from the pleistocene clay of St. Erth, Cornwall, which he has been examining for the past few months; some of the species are extremely rare, and Mr. Wright is again to be congratulated for the discovery of several forms which are new to science, which he exhibited with great pleasure. A. Speers, B.Sc., exhibited a number of rock sections and sands by the microscope; N. Carrothers, a collection of mounted plants; G. M'Lean, a large number of mounted seeds; J. H. Davies, some botanical rarities in *Elatine hydropiper*, a water plant lately discovered in the Lagan Canal; also *Solanum nigrum*, the black nightshade, from near

Lisburn, a very uncommon casual in the North-East of Ireland. The seeds of *Elatine hydropiper* were exhibited by W. Gray, M.R.I.A. At various other tables exhibits were made by Professor Symington of hand-power lenses for low-power work ; H. Gore Cuthbert, terminal cells of *Colletes pisistigma* from Castlegregory; Professor T. Johnston, slime fungi ; J. Vinycomb, book-plates; John Adams, fresh plants ; L. M. Ewart, beetles and large grasshoppers, collected in the Ligurian Riviera, 1898 ; S. N. Carpenter, B.Sc., the nest of *Atyfus ficeus*. Dr. Scharff and Mr. Welch also exhibited specimens of *Mysis relicta*, which they recently dredged in Lough Neagh. These are new to the British fauna as living animals.

At nine o'clock the President (Rev. C. H. Waddell) made a few remarks on the objects and aims of the Club, after which the lights were lowered and a lantern display given. All the lantern slides were illustrative of the Club's excursions during the past summer. Wm. Gray exhibited and described a series of lantern slides of views taken by him at the local excursions. W. J. Fennell dealt with the local excursions and the Irish Field Club Union's excursion to Kerry, followed by J. St. J. Phillips on the same excursion. All the Kerry views were original, and were taken during the past summer to illustrate natural history and archæology or some striking incidents. The lantern was manipulated with great skill by A. H. Hogg, of Lizers.'

During the evening many of the visitors remarked on the suitability of the Free Library and Museum for meetings of this kind, and not a few regretted that meetings of such societies as the Field Club, which go to further the objects of Free Library and Museum, by bringing instruction into our midst, were not held oftener in this building. All appreciated the action of the library Committee in granting the use of the building for the occasion. The Secretaries of the club got every help from the librarian, G. H. Elliott and his assistants, to whom much credit is due for the smooth working of all the arrangements.

PRESIDENT'S ADDRESS.

This Club held the first meeting of the Winter Session on the 15th November, when the President, Rev. C. H. Waddell, B.D., delivered his inaugural address on "Plant Societies, and the Distribution of Plants in N.E. Ireland." The lecturer said the social aspect of the life of plants is an interesting study and aid to understanding the way in which the genera and species are distributed. There is a striking parallel between the process by which the races and societies of plants have spread over the earth and the history of the races of men. An account was then given of what may be called the ethnography of plants. The flora of Ireland is mixed, not a pure race, indigenous to the soil. The main stock is British, but Ireland possesses in the South-West a small but interesting group called the Cantabrians, whose headquarters is in the Pyrenees. By means of a map, which showed how Europe formerly extended its coast line north-west, and included the British Isles, it was pointed out that in this way these Spanish plants reached Ireland. They were cut off from return when the channel came into existence later on. A still smaller group of American plants, which include the blue-eyed grass, pipe wort, and others, probably reached Ireland from the west by way of Greenland and the Faroes. The main progress of plants, however, as of animals, is westwards, and it was shown how the Irish flora, like the nation, consists of a mixed race of immigrants from various parts of Europe, which have now settled down into a natural plant society. The American weed was mentioned as an instance of a colonist. It came to this country first in 1836, when it was observed in a pond at Waringstown, by John Trew, Mr. Waring's gardener. Between 1842 and 1847 it had spread all over England. On the Continent it reached the Loire in 1875, and has been heard of from the Danube, Pyrenees, West Prussia, and Poland. In Canada it does not choke the streams as with us, since the frost cuts it down in winter ; it does not perfect fruit in this

country as the plant is dioicous, and only the female plant is found here. In the new edition of *Cybele Hibernica* it is stated to be gradually decreasing throughout Ireland, a fact which will be welcome news to mill-owners, if it turns out to be correct. Another alien also of a troublesome character was described—the rough hawk's beard, *Crepis biennis*, hailing this time from Germany. Probably imported with grass-seed, since 1880 it has increased to such an extent as to spoil the hay in wet meadows. Here was work for the proposed Board of Agriculture in taking measures to stop the spread of this weed, and see that imported grass-seed was free from its seeds. A natural plant society is one which can maintain itself. Such a community as springs up on a garden plot or along a newly made railway is unnatural, in the sense of not being a well-proportioned and self-supporting community. In a short time the weeds and casuals will take their departure if left to nature, and a natural and well-balanced community will take its place, such as we find on undisturbed ground, or in an old meadow. Environment has, of course, much to do with the character of the plant society of a place. The bog, the wood, the mountain, have special plants of their own which we find associated. The rocks have an important influence on the flora, and North-East Ireland has a most interesting community of plants for this reason, that it contains such a variety of rocks. Mosses are an even better guide than seed plants to the kind of rock on which they grow, and a bryologist ought to be able to tell the kind of rock from the mosses which grow on it. There is a striking difference between the basaltic and limestone flora of County Antrim, and the silurian or granite flora of County Down.

At the close of the lecture Mr. J. H. Davies was requested to make some observations on the recently published second edition of *Cybele Hibernica* by Mr. Colgan and Dr. Scully. He thought that some indication of the spirit by which they had been animated might be found in the quaint words of the amiable Caleb Threlkeld, written in the early part of last

century, which they had chosen as a motto, and which he read. Mr. Davies called attention to the chief features which he said must be regarded as an important addition to Irish botanical literature, and concluded by stating that the authors are to be heartily congratulated on their successful achievement on having produced a work of great excellence, in which is set forth with care and accuracy the present state of our knowledge of Irish topographical botany. Mr. S. A. Stewart said that the very thoughtful and instructive address to which they had just listened was a type of what the address of the President of a Naturalists' Field Club should be. He was glad to see that so much interest was now evinced in the flora of the North of Ireland, and that many young and capable hands were coming forward to carry on the work of botanical research in our district. Individual plant companionship was very interesting; in collecting one would often meet with such cases. As an instance it might be mentioned that a small plant, *radiola* or allseed, will almost always be found associated with one still smaller, *centunculus* or chaffweed.

2 December.

THE SECOND MEETING of the Winter Session was held Tuesday evening, 2nd December, in the Museum. Mr. William Gray, M.R.I.A., occupied the chair. Before proceeding to the business of the evening reference was made to the loss the Club had sustained in the death of Mr. Lavens Ewart, the late President. Several members spoke, and it was resolved to send a letter of sympathy to Mr. Ewart's family expressing the esteem in which Mr. Ewart was held, and deeply regretting his loss.

Mr. James St. J. Phillips (Hon. Secretary) then read some notes on the geological features of Kerry, as observed on the Irish Field Club Union's excursion. To us, familiar as we are with the features of Antrim and Down, Kerry presents itself as a series of somewhat striking contrasts, a number of which were pointed

out. The coastline of Kerry, deeply indented by long estuaries, was compared with the comparatively unbroken lines of the Antrim and Down coasts, and the causes of this remarkable difference pointed out. Reference was made to the geological formations represented in a section between Bantry Bay Kenmare, and Killarney, and the physical geology of these traced. After the old red sandstone and carboniferous limestone had been laid down and consolidated, a series of strains in the crust of the earth passed over the South of Ireland and certain parts of the Continent. These strains left their evidences in the immense number of folds that are now found in the rocks. The two great folds between Kenmare and Glenariff on the one side and Kenmare and Killarney on the other were described. The axes of these folds run east and west, the summits forming mountains and the troughs valleys. The age at which this folding took place was previous to the time when the lias and white limestone of Antrim was formed. Since the close of the period at which the carboniferous limestone was laid down this district has been above the sea and subject to aerial denudation. Thus the Kerry Mountains are true mountain chains, and are older than the chalk and basalt hills of Antrim. Detailed reference was made to the igneous rocks of the district near Killarney, and their nature, age, and occurrence explained and contrasted with the igneous rocks of Antrim. The district is of interest to the glaciologist, as many of the roadside features and much of the scenery are due to glacial action. Characteristic lantern slides were used to illustrate these. Guidebooks and railway advertisements often refer to the "fiords" of Kerry. It is a good catchword, but, as was shown, the fiords of Kerry are of much greater antiquity than the ice age, and, though ice had much to do with the surface sculpturings of the land as observed to-day, it was in no sense the cause of the so-called fiords, and in the scenery as it charms us to-day we see but the arithmetical resultant of forces that have been at work through unnumbered ages.

In some notes on the fauna of County Kerry, Mr. R. Welch

confined himself to those species of rather special interest from their limited range in Ireland and from the fact that they are found nowhere else in the British Isles but in County Kerry or the South-Western corner of County Cork. Among these were—*Linnæa involuta* Thomp., a little freshwater shell, only found hitherto in one little mountain tarn on Cromaglan Mountain above the Upper Lake, Killarney; *succinea oblonga*, one of the species of amber shells, and an excessively rare species in Britain, usually found dead in river flood material but of which nineteen living specimens were found by the excursion party last July; *geomalacus maculosus*, the spotted slug of Kerry, first found there in 1842, but now known to occur also in the South-Western corner of County Cork and in Portugal, one of a fairly large number of animals and plants whose range in Ireland and South-Western Europe seems to point very clearly to a former land connection between Ireland and the European Continent. Slides of these and several insects were shown, including the great wolf spider (*dolomedes fimbriatus*), the wolf spider (*pisaura mirabilis*), making a nest for its young; the wood ant (*formica rufa*), and its nest of pine needles and bits of grass; with the holly-boring weevil, the lobster beetle, the lobster moth, and some other species. In some cases specimens of the insect were shown instead of slides; specimens of the more interesting shells collected were also exhibited.

The next paper was read by Mr. Francis Joseph Bigger, M.R.I.A., dealing with the antiquities of Kerry generally, more especially the ancient church of the O'Sullivans and Killmakillogue and the O'Shea Church at Feaghna. The patron held at the holy lake at the former place was graphically described, and a full history of it given. The stations and remarkable Bullan Stone at Feaghna were also the subject of illustration. The other places noted were Ardea Castle, Ardfert Abbeys, Gallerus Celtic Church, Kilmakedar Abbey and Church, and Aghadoe Abbey and round tower. The different places mentioned were illustrated and explained by a series of beautiful

slides taken on the Club excursion by Dr. Fogarty, of Limerick, and Messrs. Welch, Fennell, and Phillips, of Belfast. An animated discussion followed the reading of the several papers.

17 January.

THE THIRD MEETING of the Winter Session was held on Tuesday evening, the 17th January, in the Museum, Rev. C. H. Waddell presiding. Two papers were read. The first paper, by the Rev. W. F. Johnson, M.A., dealt with Irish butterflies. The Lecturer said—Out of the sixty-seven species of butterflies in the British list, only forty-one can be claimed for Ireland, and of these, several are mere casual visitors, while others are confined to particular parts of the country. Following the arrangement of Barrett's *Lepidoptera* of the British Islands, the best and most complete modern work, he gave a full account of our commoner species explaining the marks of distinction of the species, their food plants and many particulars of their habits.

He described the three white or cabbage butterflies. The large white *Pieris brassicae* is a fine insect, large specimens measuring nearly three inches in expanse of wings. The larva feeds on cabbage and at times is destructive from its numbers. There are two broods in the year, the first appearing in May and the second in July. The first brood are the result of the eggs laid by the second brood, these eggs develop into caterpillars which feed up and turn into chrysalises, continuing in that state through the winter, and being capable of bearing a considerable amount of cold. He had observed a chrysalis on a north wall frozen hard, from which the butterfly duly emerged in the following spring.

The small tortoiseshell *Vanessa urticae* is a very beautiful and also a very common insect. It is double-brooded, the first brood appearing in June and the second in August or September. A number of the second brood pass the winter in the perfect state, appearing very early in the spring. He had taken it as early as 20th March. As it hibernates in houses it is very often roused from its winter sleep by the warmth of the house, and the inhabitants are surprised by the sight of a butterfly in mid-winter.

The larva of this species feeds on the common stinging nettle and is gregarious. Its colour is really yellowish, but it is so thickly dusted with black dots that it looks black. It is very easy to rear, and any one who has the fancy to do so can easily watch the progressive development of the larva and pupa into the perfect insect. The Marsh Ringlet is widely spread through the bogs and mountains of Ireland. Its larva is bright green with a darker line down the back and lines of pale yellow at the sides. It feeds on the beaked rush and cotton grass, and also has been found on carex. The pupa is suspended to the stem or leaf of the food plant high up.

A very rare Irish visitor is the Camberwell Beauty *Vanessa antiopa*, a specimen of which was captured near Belfast in 1872 and is in the cabinet of Canon Bristowe. It is strange that this insect which is common in Norway should only be an emigrant to the British Isles. Damp, however, has a destructive effect on insects. In Norway there is greater cold but less damp, and in summer there is great heat in its sheltered valleys.

Anyone, who wishes to acquire further information about Irish butterflies, will find it in Mr. W. F. De Vismes Kane's catalogue of the *Lepidoptera* of Ireland, in the *Entomologist* for 1893, or in Mr. C. G. Barrett's British *Lepidoptera*, Vol. I. The following list of Irish butterflies was given to show all the species that have been found at any time in Ireland up to date:—

IRISH LEPIDOPTERA, RHOPALOCERA.

PIERIDÆ.

- Pieris brassicæ* L.
 „ *rapæ* L.
 „ *napi* L.
 „ *daplidice* L. †
Anthocaris cardamines L. †
Leucophasia sinapis L.
Colias hyale L. †
 „ *edusa* F. *
Gonepteryx rhamni L. *

Vanessa atalanta L.

- „ *cardui* L.
Argynnis paphia L.
 „ *adippe* L. †
 „ *aglaia* L.
 „ *lathonia* L. †
 „ *selene* Schiff. †
Melitæa athalia Esp. †
 „ *artemis* Hüb.

SATYRIDÆ.

LYCÆNIDÆ.

- Thecla betulæ* L.
 „ *quercus* L.
 „ *rubi* L.
Chrysophanus phlæas L.
Polyommatus ægon Schiff. †
 „ *icarus* Rott.
 „ *argiolus* L.
 „ *minima* Fries.

- Erebia epiphron* Knoch. †
Satyrus semele L.
Pararge egeria L.
 „ *megæra* L.
Epinephele janira L.
 „ *tithonus* L.
 „ *hyperanthus* L.
Cænonympha davus F.
 „ *pamphilus* L.

NYMPHALIDÆ.

- Vanessa urticae* L.
 „ *io* L.
 „ *antiopa* L. *

HESPERIDÆ.

- Hesperia linea* F. †
 „ *sylvanus* Esp. †
Nisoniades tages L.

* Casual visitors. † Single records.

Mr. Donaldson, one of the original members of the Club, who has been absent in Massachussets for three years, gave a very interesting paper on New England butterflies. In commencing, he told how on leaving Belfast he had resolved to abandon natural history pursuits, a resolution which was only in force for half a day when he encountered the butterfly known in North America as the monarch (*Danaus archippus*). He described this beautiful insect and its life history in some

detail. The larvæ feeds on plants of asclepias or milkweed, which is common everywhere in the Northern States. The eggs are laid on the leaves of the food plant ; they hatch in about four or five days, and the caterpillars commence to feed ; they eat voraciously and mature rapidly, becoming often full grown in two weeks. The Danais in question is one of the most widespread butterflies in America, being found over almost the entire continent, from Canada to Patagonia and from the Atlantic to the Pacific. It has extraordinary powers of flight, and in autumn, when abundant, collects in vast flocks of hundreds of thousands and migrates southwards. They return north in the spring, not in crowds, but singly, the females laying their eggs wherever they may chance to be, many of the young butterflies proceeding further north as soon as they emerge. Within the last thirty years this insect is said to have spread all over the islands of the Pacific, and even to Australia and Java. In 1877 it made its way to the Atlantic coast of France, and a number of instances of its capture in England have since been recorded. The reader met with one of our own rather rare butterflies, the Red Admiral, in great abundance, and one of the rarest British species, the Camberwell Beauty, he found in profusion in New England. Many interesting facts were mentioned concerning the various families of North American butterflies and macro lepidoptera. These details were from his own personal observation, and were illustrated by abundant and beautiful specimens of the species referred to.

Both papers gave rise to an animated discussion, several members referring to their experience in the study, collecting and mounting our native butterflies.

21 *February.*

The Field Club held a successful and well-attended meeting in the Museum on Tuesday evening, 21st February, William Gray, M.R.I.A., in the chair. This was the fourth meeting of the Session at which Professor Symington, F.R.S.E., of Queen's College, Belfast, delivered a lecture on "Whales; the significance of their structure and development in connection with theories as to their origin." The Professor stated that in their struggle for existence numerous mammals belonging to widely-separated orders have been driven to spend a portion of their lives under water. Such was the case with the seal, water vole, beaver, and hippopotamus. In other groups the adaptation to aquatic life is complete, and the animal has lost the power of maintaining itself on land and spends its whole life in water. To this group the whale belongs. In popular imagination they are fishes, but the zoologist finds that they possess all the essential features of a mammal. They breathe by lungs, their blood is warm, their young are born alive, and are nourished after birth by milk from the mother. If we are to judge of success in life by size of development, the life adopted by the whale has proved the wisdom of their choice. The lecturer showed lantern views of the principal kinds of whales and pointed out their leading characters. Land mammals always possess hair, but in the whale the disappearance of hair and development of blubber under the skin are to be regarded as adaptations to an aquatic life, as facilitating the movement of the animal in the water, while the subcutaneous fat prevents the radiation of heat from the body better than a covering of hair. In a few whales hairs are found on the upper lip during early life, but this moustache disappears when they grow to manhood. Certain anatomical peculiarities were then pointed out, which lead Professor Kükenthal to believe that the toothed whales and whalebone whales have a different origin. The toothed whales have sprung from some primitive mammals, whose backs were covered with a hard exoskeleton, while the ancestors of the

whalebone whales were land animals with a hairy covering for the skin. The flippers of whales are modified fore limbs of mammals, with adaptations and modifications to suit aquatic life. In the number of bones in flipper the whale closely resembles the extinct ichthyosaurus. This is not a conclusive proof that both have sprung from a common stock, though it may be fairly assumed that both represent a modification of different types as an adaptation to the same mode of life. The hind limbs are not to be detected on the surface of the body, but embedded in the trunk are certain bones, rudimentary hip, thigh, and in some cases leg bones, but of very small size. The significance of their presence supports the theory that the cetacea were originally four-limbed animals. Many facts about the teeth of whales were then stated. In dealing with the tail as an organ of locomotion, the lecturer said there are no data to decide the relative efficiency of a whale's tail as compared with a modern screw propeller, but there is at least one point in which the tail has an advantage—its internal structure is specially adapted to its function, its fibres run in the direction to give the maximum of strength with the minimum of material. The lecturer discussed the various theories as to the origin of whales. He favoured the view that the toothed whales were a more ancient group and differed more from ordinary mammals than the whalebone whales. The attempts to prove that the whales have descended from the carnivora or the ruminants had not been very successful. On the whole, the facts at present known favoured the hypothesis that both groups of whales departed at a very remote period from the primitive mammalian stock, the evidence at present available being too incomplete to justify any dogmatic assertions. In conclusion, the Professor expressed his indebtedness to Miss Patterson, a member of the Club, for assistance given in the preparation of the numerous illustrations. The lecture gave rise to a very interesting discussion, in which the Chairman and several of the members joined.

21 February.

THE FIFTH MEETING for the Winter Session was held on 21st February. Some members brought in exhibits to the popular science gossip half-hour before the opening of meeting.

Messrs. H. L. Orr and R. Welch exhibited a series of minute land shells (genus *vertigo*) from various localities, including a number of *vertigo antivertigo*, recently collected at Shaw's Bridge, Belfast, where there is a very large colony in the marsh ; also some small land and freshwater shells, which have not yet been found in Ireland, though long known in England.

Mr. M'Kinney exhibited coral found in clay near Glenarm.

Mr. Vinycomb taking the chair, the business of the evening proceeded, when

Mr. Gray submitted his report as delegate from the B.N.F.C. to the meeting of the British Association at Bristol. He described the object, constitution, and method of procedure of the Association, and stated that the Committee of Corresponding Societies was framed for the purpose of securing the co-operation of all such local scientific societies publishing transactions and papers calculated to further the advancement of science. The Belfast Naturalists' Field Club was one of the first local societies registered as a corresponding society by the British Association. The delegates meet in conference twice during the annual meeting of this Society, when suggestions are given as to the subjects calling for investigation during the coming year. At the Bristol meeting the subject of coast erosion was recommended for consideration, and the best methods of observation and records were referred to, and the Council of the Association was requested to bring the matter before the Admiralty, with the view of obtaining the aid of the coastguard in furthering the investigations of local societies and other scientific inquirers. The question of geological photography was also considered, and a very high compliment was paid to the B.N.F.C. for the very excellent photographs already contributed by Mr Welch, Mr. Phillips, and other members of the Field Club.

The desirability of having all reports and, if possible, all transactions published of uniform sizes was recommended, to facilitate their orderly binding for reference. Mr. Gray gave particulars as to the two best sizes recommended.

The Ethnographical Survey Committee recommended this subject for the investigation of the corresponding societies. The work already done in Ireland was acknowledged, but one branch of the subject had not received in Ireland the attention it merited—namely, the archæological survey of this country. It was pointed out that with the number of capable organisations now operating in Ireland there should be no difficulty in compiling a very complete catalogue of all the ancient monuments of Ireland. The Conference Committee resolved at Bristol to write to the Royal Society of Antiquaries of Ireland pointing out the necessity for undertaking this work.

Mr. Gray referred to the fact that two meetings of the British Association had been held in Bristol since the last meeting in Belfast in 1874. Since then the Association met several times in England, Scotland, Wales, and Canada, as well as in Dublin. It was therefore time to ask the Association to come to Belfast again. Should an invitation be sent this year, the Association is not likely to come to Belfast before 1901; so the sooner the invitation is issued the better. Such an invitation would be very cordially responded to by the members of the Association generally.

Mr. Gray, in his description of Bristol, referred to John Cabot, who, sailing from Bristol in 1497, was the first to discover the mainland of America. Columbus in 1492 reached the West Indian Islands via the Canary Islands. Cabot and his sons sailed direct from Bristol, and landed on the mainland of America. In 1897 Lord Dufferin laid the foundation-stone of a Cabot memorial tower on Brandon Hill, Bristol, and he opened the finished structure the day before the opening meeting of the British Association. The citizens of Bristol boast that the Great Western steamer, sailing from Bristol, in April, 1838, was the first steamer that ever crossed the Atlantic,

arriving at New York on the 23rd April, after a voyage of fifteen days; but this claim cannot be sustained, because the s.s. *Sirius*, 412 tons, sailed the same month direct from Cork Harbour, and reached New York on the 23rd April, and thereby to the Irish boat is due the credit of being the first steamer to cross the Atlantic. Mr. Gray described the various places of interest in and around Bristol, as well as the places visited on the excursions, including Strandon Drew, Raglan Castle, Tintern Abbey, Salisbury, Old Sarum, and Stonehenge. His descriptive sketches were very fully illustrated by original lantern slides, with special reference to the Anglo-Norman invasion of Ireland, under Strongbow.

After the lecture the Chairman and other members joined in a short discussion.

The Secretary announced the gift of 123 dried plants from Mr. R. L. Praeger, M.R.I.A., and a geological map from Mr. H. J. Seymour.

GENERAL MEETING.

The thirty-sixth annual general meeting of the Club was held on the 25th April in the Museum. Rev. C. H. Waddell, B.D., President, occupied the chair. The Secretary read the annual report, which stated that the work of the Club had been carried on successfully during the year by excursions and evening meetings. A feature of interest was the appointment of a field lecturer, whose explanations and short lectures given during the excursions were much appreciated by the members. A new feature in connection with the winter meetings was the institution of a science gossip half hour before each meeting. These half hours were well attended, and gave beginners in natural history or archæology an opportunity of getting information on subjects in which they were interested. Three collections submitted in competition for prizes were of considerable merit—one by Mr. Adams, containing a plant new

to Ireland, as well as several additions to the flora of the North-East of Ireland. This collection received special mention. Mr. H. L. Orr's collection of land and fresh-water shells also contained some new species as well as a good representation of more usual forms, all neatly mounted and carefully named, and secured the prize offered. Miss Finlay secured a prize for flowering plants. The honorary treasurer submitted accounts for the year, which showed the Club was in a good financial condition. William Gray spoke on the report and accounts, which were passed, and will be printed and circulated among members as usual. The election of officers for the coming year was proceeded with as follow:—Rev. C. H. Waddell, B.D., President, F. J. Bigger, Vice-President; W. H. Phillips, Treasurer; William Swanston, Librarian. A vacancy having occurred by retirement of a Secretary, William Gray, M.R.I.A., was unanimously elected to the post along with W. D. Donnan, M.D. The new Committee comprises—George Donaldson, W. J. Fennell, John Hamilton, F. W. Lockwood, J. St. J. Phillips, S. A. Stewart, F.R.S.E.; Miss S. M. Thompson, John Vinycomb, Robert Welch, and Joseph Wright, F.G.S. Suggestions were received and discussed as to places of interest for summer excursions.

W. H. Phillips gave an address on British ferns, in which he showed how the study of ferns is most interesting and fascinating, being half botany and half horticulture. The Counties of Antrim and Down are full of glens, mountains, and roadsides well stocked with varieties. Ferns belong to the order of flowerless plants, and are distinguished from others in this class by the nature and position of the cases in which the spores are contained. These spore cases are formed mostly on the back or margin of the leafy portion or frond. The roots are always fibrous, and in their younger portions are covered with fibrils or soft hairlike bodies, which give them a downy appearance. The stems assume two forms called the caudex and the rhizome. In the caudex the fronds rise from the termination of the axis of growth either in a single

series or in a kind of crowned whorl. In the rhizome stem the fronds are more scattered, and are developed from the sides of the axis of growth which is in advance of the last formed fronds. The leaf-like organs are called fronds; they differ from the leaf of flowering plants in that it bears on its surface the parts known as the fructifications, which the true leaf does not. When the fronds become fully developed, two parts, the stipes and the lamina are distinguishable; the stipes in the stalk, and the lamina the leafy portion. This part affords great variety in the mode in which it is divided, fronds are undivided, others divided into a great variety of forms. Fern fronds are traversed by ribs or fibres, which serve to give them their elasticity; these are the veins which are given off from the midrib, and, as a rule, are furcate. It is probably to this furcate growth that we are indebted for the endless varieties of British ferns. The veins are developed faster than the herbaceous portion, and so the fronds branch and tassel. The reproductive organs consist of spores enclosed in cases, which are collected into groups called sori, and in most British ferns are borne on the back of the fronds. From the germinating spore arises a leafy expansion called a prothallium, which gives off delicate root fibres from the under surface. Scattered among these fibres are several minute microscopical cellular bodies which are called antheridia and archegonia, which correspond with and perform the functions of stamens and pistil in flowering plants. The number of ferns known to botanists number about 3,000. Of these about 43 are natives of the British Isles, and about the half are to be found in the Counties of Antrim and Down. There seems to be no limit to the varieties which may be found or raised from spores. By careful search these variations are to be found in almost all parts of the country, and the possibility of finding new forms gives a stimulus, and the exertion of a long walk raises the enthusiasm of the fern collector in a way that is not done by any other class of plants. A description of the different genera and species was then

given showing the salient points of structure and the difference of each, and many examples were shown and explained after the lecture.

REPORT OF THE GEOLOGICAL SECTION.

The Geological Section have to record another year of useful activity in this branch of the Club's work. Several excursions were held during the year, and were well attended.

During the early part of the Winter Session the Section held meetings once a month to discuss points of interest. The Committee of the Section invited Professor Cole to deliver a Lecture, the subject being—"The Volcanic North, or how Ireland became an Island." The meeting was held in the Museum and was well attended.

The Botanical and Geological Section held a combined meeting, 21st January, 1899, when Mr. Praeger gave a chat on Glacial Fossils.

At the request of the Committee J. St. J. Phillips undertook to give a short series of "Introductory Talks on Geology." This series was intended for the benefit of new members and those desirous of beginning the study of Geology, and attracted a considerable number to the six meetings devoted to the series. A list of titles of each evening talk will indicate the subject dealt with.

1. What is a Rock? A classification of Rocks.
2. Destruction and Construction—External and Internal Agencies.
3. Some Products from Nature's Laboratory.
4. The Evolution of Landscape and Rock Structure.
5. Fossils, their Nature and Occurrence. Records of Life from the "Ancient" Rocks.
6. Fossils—Records from Recent Rocks and Conclusion.

Each of the "Talks" was appropriately illustrated by photographs, diagrams, lantern slides, and specimens, as far as possible preference was given to local examples.

In two Field Excursions held in connection with the series much was illustrated *in situ* in Scrabo Quarries, and at Magheramorne and Barney's Point.

At the closing Meeting the hope was expressed that a similar series would be instituted for next year dealing more in detail with some of the subjects.

A few of our Members still very actively continue the work of Glacial Geology, on which Miss S. M. Thompson furnishes the Report.

J. ST. J. PHILLIPS,
Hon. Sec. of Section.

GLACIAL GEOLOGY.

Investigations into the Glacial Geology of our District progress steadily though slowly, owing to the want of more workers in this important branch of inquiry. Since the last detailed Report of work accomplished which was published in our Proceedings for 1895-6, twenty-five new localities have been more or less exhaustively examined, and results recorded in the schedules prepared for the purpose. The glacial deposits at Newry, Dromore, and the Shore of Strangford Lough South of Castle Espie, in Down, and on the slopes of the Black Mountain, Longhurst, Drum-Tough, Cranfield Point (Lough Neagh), and at Kilwaughter above Larne, in Antrim, have been worked up, the remainder will require many visits before the schedules can be completed.

Welcome help is afforded by some of our members who bring in erratics from promising localities casually visited. For instance, Mr. Knowles reports the occurrence of Antrim flints in the boulder clays of Co. Donegal. The Hon. Sec. would be glad to receive information of new gravel pits or brickfields opened, as boulder clay sections exposed on roads or railways, *especially from inland localities*. The glacialists would then visit such localities and secure valuable information that might otherwise be lost. Such information is specially desired from

a few localities in Southern Armagh, Tyrone, and Monaghan, as the ubiquitous erratics of Ailsa Craig have been discovered as far inland as Newry, Armagh, Killagan, and at the mouth of the Bann. It seems desirable to push the search into the above-named Counties, and if necessary throughout the entire province. The flow of the ice can be accurately determined by studying the distribution of erratics, as we are fortunate in possessing several peculiarly characteristic rocks that serve as landmarks in our drifts. It is encouraging to see even a remote prospect that the work of the past six years may be brought to a conclusion.

A collection of unknown erratics which had accumulated during the past three years, was recently submitted to Mr. A. M'Henry, M.R.I.A., for identification; with his usual kind promptitude he returned them with notes of their parent localities, which proved both interesting and important.

In a chat on Glacial fossils Mr. Praeger described the great prevalence of shells and shell fragments in the glacial deposits of the Dublin district and exhibited a fine collection which he subsequently presented to the Club. Especially noteworthy is Mr. Praeger's mention that as yet they have not been found in the Central Plain of Ireland, being hitherto confined to localities not more than 3 miles distant from the present seaboard.

The Schedules of results obtained up to the present are open to the inspection of members, but it seems scarcely desirable to publish a detailed list until the remaining localities have been finally examined.

A paper describing the year's work is annually read before our Geological Section, and an abstract of the last three years' work can be furnished to the Erratic Blocks Committee of the British Association this Autumn.

SYDNEY M. THOMPSON.

REPORT OF BOTANICAL SECTION.

Monthly meetings were held regularly during the winter season, and although the subject, "British Grasses," was not such a popular or easy one as those chosen in previous years the attendance was very good throughout. By the kindness of several members a large and valuable addition has been made to the Herbarium, labels have been presented and the plants mounted and arranged. A collection of mosses has also been commenced. When these are completed and a few more text books have been added to the Library they will form a valuable and much needed help to illustrate the subjects treated of at the meetings of the Section.

Several new localities for interesting plants have been recorded at the Meetings.

C. H. WADDELL.

R U L E S
OF THE
Belfast Naturalists' Field Club,
1898-99.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the object of this Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall first pay an entrance fee of 5/-, and be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of the votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club; and whose usual residence is not less than twenty miles from Belfast. That such Members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the Members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Librarian, and two Secretaries, and ten Members, who form a Committee, and shall hold not less than eight Meetings in the year. Five Members to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

The Committee may from year to year appoint a Sectional Committee as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six Members of the Club, not less than two being members of the Club's Committee. No financial responsibility to be incurred by the Sub-Committee or any officer of the Club without the previous approval of the Club's Committee. Any Sub-Sectional Committee may elect its own Chairman and Secretary from its members.

VII.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VIII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to be original and to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

IX.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collections of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year.

X.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and Officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of such intended alteration.

XI.

Members of other Irish Field Clubs residing temporarily or permanently in or near Belfast may be enrolled members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year on production of a receipt showing that such

subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XII.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subject mentioned in such written requisition.

XIII.

That the Committee may be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its members by such other societies.

NOTICE.

EXCHANGES OF PROCEEDINGS.

Barrow Naturalists' Field Club.

Annual Report and Proceedings, Vol. XII. and XIII.

Bath Natural History and Antiquarian Field Club.

Proceedings Vol. XI., No. 2.

Belfast—Natural History and Philosophical Society.

Report and Proceedings, 1897-98.

„ Ulster Journal of Archaeology.

Vol. V., Parts 1-4.

Berlin—Helio Abhandlungen und Mittheilungen 1898-99.

Berwickshire Naturalists' Club.

Proceedings, Vol. XVI., Nos. 1, 2. .

Session Books of Bonckle, by James Hardy, LL.D., 1899.

Brighton Natural History and Philosophical Society.

Annual Report and Abstracts of Papers, 1899.

Cardiff Naturalists' Society.

Report and Transactions, Vol. XXX.

Dublin—Royal Irish Academy.

Transactions, Vol. XXXI., Part VII.

Proceedings, Vol. IV., No. 5, Vol. V., Nos. 1, 2.

„ Royal Society of Antiquaries of Ireland.

Journal, Vol. IX., Parts 1, 2, 3.

Edinburgh—Botanical Society.

Transactions and Proceedings, Vol. XXXI., Parts 1, 2, 3.

„ Geological Society.

Transactions, Vol. VII., Part 4.

Frankfort—Bericht der Senckenbergischen Naturforschenden.

Gesellschaft, 1898-99.

Katalog der Reptilien Sammlung in Museum.

Glasgow Philosophical Society.

Proceedings, Vol. XXIX., 1897-98.

Hamilton Association.

Journal and Proceedings, Nos. XIV. and XV.

Hertfordshire Natural History Society and Field Club.

Transactions, Vol. IX., Parts 5-9, Vol. X., Parts 2-4.

Hull Scientific and Field Naturalists' Club.

Transactions Vol. I., No. 1.

Leeds Philosophical and Literary Society.

78th Annual Report, 1897-98.

Lille—Scientific Papers (7.)

From M. Charles Janent.

Liverpool Geological Society.

Proceedings, Vol. VIII., Part 2.

London—British Association for the Advancement of Science.

Report of the Brighton Meeting, 1898.

„ Geologists' Association.

Proceedings, Vol. XV., 5 Parts, Vol. XVI., 5 Parts.

„ British Museum Publications.

List of Genera and Species of Blastoidea.

„ Types and Figured Specimens of Fossil Cephelopoda.

„ The "Quarry" Publishing Company, Ltd.

Applied Geology by J. V. Elsdon, F.G.S.

„ Reliquary and Illustrated Archaeologist.

6 Parts.

Marlborough College Natural History Society.

Report No. 47.

Manchester Field Naturalists and Archaeologists Society.

Report and Proceedings, 1897-1898.

„ Microscopical Society.

Transactions and Annual Report, 1897-98.

Montevideo—Museo Nacional.

Annals Tomo II., Fas. 8, 11, 12, Tomo. III., Fas. 9, 10.

Norfolk and Norwich Naturalists' Society.

Transactions, Vol. VI., Part 4.

Ottawa Literary and Scientific Society.

Transactions No. 1, 1897-98.

Penzance Natural History and Antiquarian Society.

Report, 1897-98.

Saint Johns—New Brunswick Natural History Society.

Bulletin, Vol. IV., Parts 1, 2.

San Jose—Museo Nacional de Costa Rica.

Informe, 1897-98 and 1898-99.

Leiden—Ethnographische Abt. lunge.

Katalog, No. 1, 1897.

Stavanger Museum.

Aarsberetning for, 1897-98.

Toronto—Canadian Institute.

Transactions, Vol. V., Part 2.

Proceedings, Vol. I., Parts 4, 5, 6, Vol. II. Parts 1, 2.

U.S.A.—Boston Society of Natural History.

Vol. XXVIII., 11 Parts.

,, Chicago—Academy of Sciences.

Annual Report, 1897, and Bulletin II.

,, Chapel Hill N.C.—Elisha Mitchell Scientific Society.

Journal, 1897-98.

,, New York—Academy of Sciences.

Annual Reports, Vol. X., Parts 1-12, Vol. XI., 1-3,
Vol. XII., Part 1.

Transactions, Vol. XVI.

,, ,, American Museum of Natural History.

Annual Report, 1897-98.

Bulletin, Vol. X., Vol. XI., Parts 1, 2.

,, Milwaukee—Public Museum.

Annual Report, 1897-98.

,, Madison—Academy of Science Art and Letters.

Transactions, Vol. XI., 1896-97.

,, Wisconsin Geological and Natural History Survey.

Bulletins, Nos. 1, 2.

,, Philadelphia—Academy of Natural Sciences.

Proceedings, 1897, Parts 2, 3, 1898, Parts 1, 2, 3,
1899, Parts 1, 2.

U.S.A.—Rochester—Journal of Applied Microscopy.

Vol. I., No. 2.

,, St. Louis—Academy of Sciences.

Transactions, Vol. VII., No. 17-20, Vol. VIII., No.
1-12, Vol. IX., Nos. 1-7.,, Salem—American Association for the Advancement of
Science.

Proceedings of 46th Meeting at Detroit, 1897.

,, 47th ,, Boston, 1898.

,, ,, Essex Institute.

Bulletin, Vol. XXVIII., Nos. 7-12, Vol. 29, Nos. 7-12,
Vol. XXX., Nos. 1-12.

,, Staten Island Natural Science Association.

Proceedings, Vol. VI.

,, Washington—Government Printing Offices.

Detached Papers by various Authors (7.)

,, ,, Smithsonian Institution.

Annual Reports, 1895 and 1896.

,, ,, United States Geological Survey.

18th Annual Report, Parts 1, 2, 3, 4, 5.

19th ,, Parts 1, 4, 6.

,, ,, American Microscopical Journal.

12 Parts.

,, Tufts College, Mass.

Studies No. 5.

BELFAST NATURALISTS' FIELD CLUB.

THIRTY-SEVENTH YEAR, 1899-1900.

LIST OF OFFICERS AND MEMBERS.

President:

REV. C. H. WADDELL, B.D.

Vice-President:

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Treasurer:

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8 CHICHESTER STREET.

Librarian:

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CLIFTONVILLE AVENUE.

Committee:

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S. A. STEWART, F.B.S.E.

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W. D. DONNAN, M.D., HOLYWOOD.

WILLIAM GRAY, M.R.I.A., GLENBURN PARK, BELFAST.

Members.

Any Changes in the Address of Members should be at once notified to the Secretaries by Post Card.

HON. MEMBERS.

Dufferin and Ava, Marquis of, Clandeboye.

Jones, Prof. T. R., F.R.S., 10 Ulverdale Road, King's Road, Chelsea, London, N.W.

Lapworth, Professor Charles, Mason College, Birmingham.

Tate, Professor Ralph, F.G.S., F.L.S., Adelaide, South Australia.

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Adams, John J., M.D., Ashville, Antrim.

Adams, John, The Manse, Antrim.

Adams, John, New King Street.

Allen, Mrs., Alexandra Villa, Crumlin Road.

Allibon, George, 30 Donegall Place.

Allworthy, Edward, Mosaphir.

Anderson, John, J.P., East Hillbrook, Holywood.

Anderson, Robert, Donegall Place.

Anderson, James F., Ponsonby Av.

Anderson, Thomas, 41 Cliftonville Road.

Andrew, J. J., L.D.S., University Square.

Andrews, Miss M. K., 12 College Gardens.

Andrews, Miss, 12 College Gardens.

Ardill, Robert, 32 Avoca Street.

Barkley, Jas. M., Queen's Square.

Barbour, John H., 1 Hamilton Villas, Ballyholme, Bangor.

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Batt, William, Sorrento, Windsor.

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Beck, Miss Emma, 48 South Parade.

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Bell, Robert, Charleville Street.

Bell, Leonard, Braemar Terrace, Balmoral.

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Berry, Dr., 10 Dunluce Buildings, Lisburn Road.

Best, James, Clarence Place.

Bigger, Francis Joseph, Ardrie.

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Blackwood, Miss S., 84 Malone Avenue

Blackwood, W. B., University Sq.

Blair, E., Cavehill Road.

Blair, Mrs., Cavehill Road.

Bland, Major-General, Woodbank, Whiteabbey.

Boyd, Miss, Chayo, Adelaide Park.

Boyd, J. St. Clair, M.D., 27 Great Victoria Street.

Boyd, Miss, Cultra House, Holywood.

Boyd, W. C., Hazelbank Villa, Ravenscroft Avenue.

Braddell, Edward, St. Ives, Malone Road.

Brandon, Hugh B., Royal Avenue.

Brenan, Rev. S. A., B.A., Knocknacarry.

Brett, Chas. H., Gretton Villa South.

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Brown, Thomas, 108 Donegall St.

Brown, Robert, Wingfield Lodge, Bloomfield.

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Bulla, Charles, 87 Wellesley Avenue.

- Calwell, Miss E., Lismore, Windsor Avenue.
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- Carson, John, Walmer Terrace, Holywood.
- Carrothers, Nathaniel, 4 Stranmillis Gardens.
- Carter, W. Charles, 30 Donegall Place.
- Cleland, James A., Wellington Park.
- Cleland, W. W., 48 Wellington Park.
- Cleland, Mrs. Annie, 32 Lower Easton Street, Cliftonville.
- Cleland, Alex. M.J., 32 Lower Easton Street, Cliftonville.
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- Colbeck, James, Shaw's Bridge.
- Coleman, J., H.M. Customs, Southampton.
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- Cole, Rev. R., Armagh.
- Corry, W. F. C. S., Bangor.
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- Coulter, Mrs., 21 University Square.
- Craig, John C., 17 Lonsdale Street.
- Crawford, F. H., 20 Mill Street.
- Creeth, James, Victoria Street.
- Culbert, Robert, Distillery Street.
- Cunningham, Charles M., 79 Great Victoria Street.
- Cunningham, Samuel, Glencairn, Belfast.
- Curley, Francis, High St., Belfast.
- Curley, Mrs., Dunedin Terrace.
- Davies, John Henry, Lisburn.
- Day, Robert, M.R.I.A., J.P., Cork.
- D'Evelyn, Alex. M., M.D., Ballymena.
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- Dickson, Wm. W., 52 Pakenham Place.
- Dixon, W. H., Dunowen.
- Donaldson, Dixon, Islandmagee.
- Donaldson, George, Mileriver St.
- Donaldson, John, 18 Brookhill Avenue.
- Donnau, W. D., M.D., High Street, Holywood.
- Downing, W. M., 25 Garfield St.
- Duncan, William, 2 Canterbury St.
- Dunlop, Fleet Surgeon, Edenderry House, Ballylissan.
- Elliott, David, Cyprus Park, Bloomfield.
- Elliott, George H., Holywood.
- Ewart, Clement C., Glenbank.
- Ewart, Ernest, Glenbank.
- Ewart, Sir Wm. Q., Bart., Glenmachan.
- Faren, W., 11 Mountcharles.
- Fennell, Miss S., Stockman's Lane.
- Fennell, W. J., M.R.I.A.I., Chichester Street.
- Ferguson, Henry, Donegall Park.
- Finlay, Miss, Charles St., Berkhamsted, Herts.
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- Frame, John, 6 Lawrence Street.
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- Galloway, Joseph, 83 Eglantine Avenue.
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- Gibson, William, 30 Castlereagh Place.
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- Gilmore, George, Mountcharles, Belfast.
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- Godwin, William, Queen Street.
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- Green, William, 3 Hughenden Avenue.
- Greene, John J. F., J.P., Annavilla, Warrenpoint.
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- Gulbransen, A., 17 Queen's Arcade.
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- Haslett, Miss Minnie, Princess Gardens.
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- Jackson, A. T., 5 Corn Market.
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- Johnston, Miss, Glenavy.
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- Kidd, James, Brookvale Avenue.
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- Kirkwood, J. A., Dundonald.
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- Lamb, Wm. W., 34 Brookvale Av
- Lamb, Miss, Divis View, Lisburn Road.
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- Letts, Prof. E. A. Dunavon, Craigavad.
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- Logan, Mrs., Bangor.
- Lowry, D. E., 25 Donegall Place.
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- MacElheran, W. F., 3 College Gardens.
- Mackenzie, John, Malone.
- Mackenzie, Miss R. B., Carryduff.
- Macoun, W. Godfrey, 8 Claremont Terrace.
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- Malcolmson, James, Cairnburn, Strandtown.
- Malcolmson, Joseph J., Cairnburn.
- Mann, Jas. S., Ballyholme, Bangor.
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- Marshall H., Edlingham Terrace, Duncairn Gardens.
- Martin, J. McClelland, Northern Counties Railway.
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 M'Leish, John, The Mount, Mount-
 pottinger.

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 O'Neill, James, M.A., 5 College
 Square East.
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 Reid, Robert, King Street.
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 Smith, George, Linen Hall Library.
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 Wilson, George, 9 Bedford Street.
 Wilson, Abraham, 13 Springfield Rd
 Wilson, Thomas, C.E., Fleetwood St.
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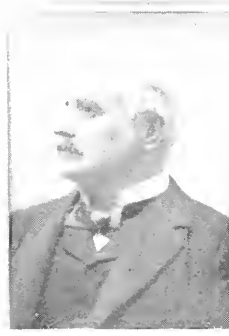
Wm. H. H. H.



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Wm. H. H.



Wm. H. H.

ANNUAL REPORT AND PROCEEDINGS
OF THE
BELFAST
NATURALISTS'
FIELD CLUB

For the Year ending the 31st March, 1900.

(THIRTY-SEVENTH YEAR.)

SERIES II.

PART VII.

VOLUME IV.

1899-1900.



Belfast :

PRINTED FOR THE CLUB

BY ALEXANDER MAYNE & BOYD, 2 CORPORATION STREET
PRINTERS TO QUEEN'S COLLEGE, BELFAST.

1901.

REPORT.

THE Committee of the Belfast Naturalist Field Club at the close of the 37th year of the Club's existence beg to submit the following Report.

After a careful revision there are now 322 members included in the Club's list of members.

The attendance at the Summer Field meetings and the lectures during the Winter Session was fully up to the average of former years, and the practical interest taken in the Club's work has been fairly maintained.

The botanical section creditably continued the Saturday afternoon excursions and their class-room demonstrations. The special report of the section is attached.

The following field meetings were held during the year :—

Armagh	20 May.
Cargan and locality	10 June.
Dundrum	24 June.
Dungiven and Limavady	11, 12 & 13 July.
Toome	12 August.
Baliynahinch	2 September.

All the excursions were well attended, and were highly appreciated by the members and visitors.

The following are the meetings held during the Winter Session, with the subjects discussed :—

- 13 Nov., Our Papuan Fellow-Subjects at Work and Play—Prof. Haddon.
- 21 ,, The Work of the Club—Rev. C. H. Waddell, B.D.
- 19 Dec., The Origin of Caverns in Limestone Districts—Adam Speers, B.Sc.
- ,, Note on Our Antrim Caves—William Gray, M.R.I.A.
- 16 Jan., The History and Antiquities of Inisclothan in Lough Ree—W. J. Fennell and F. J. Bigger, M.R.I.A.
- ,, Half-hour in the Garden—F. J. Bigger, M.R.I.A.
- 16 Feb., Botanising in the Centre and West of Ireland—R. Lloyd Praeger,

B.E., M.R.I.A.

- 20 Mar., The Supposed Occurrence of a Patch of White Lias at Macedon Point—Miss Sidney M. Thompson.
 „ The Occurrence of Natterer's Bat and the Whiskered Bat in County Down—Rev. Canon Lett, M.A., M.R.I.A.
 „ Post Tertiary Foraminifera—Joseph Wright, F.G.S.
 12 Apr., Antiquarian and Natural History Notes on the Parish of Duneane and Barony of Toome—Rev. M. Fahy.
 „ Report of the Conference of Corresponding Societies at the Dover Meeting of the British Association, by the Delegate, William Gray, M.R.I.A.

The Committee desire to record their thanks to the three Railway Companies for the prompt and generous manner in which all necessary arrangements were made for the comfort of the members attending the excursions.

The thanks of the Committee are also due to Rev. and Mrs. Fahy, Mr. James Grant, J.P.; Rev. S. Thompson, and Dr. Moore, of Limavady; Captain Ogilby, D.L.; Mrs. Macrory, of Ardmore, and all the other kind friends who entertained the members or contributed in any way to the success of the Field Meetings.

WM. GRAY, }
 W. D. DONNAN, } *Hon. Secs.*

REPORT OF BOTANICAL SECTION.

The Committee of the Botanical Section are pleased to be in a position to say that the section for the past twelve months has been pursuing its work with undiminished success. During the Summer Session the members continued the regular Saturday afternoon excursions, which were so much appreciated the previous two years, and during the season very considerably enlarged their practical acquaintance with the British grasses to be found in the Counties of Antrim and Down. These excursions are educational in a very high degree, and afford to the junior members of the section exceptional opportunities of becoming acquainted with the flora of the neighbourhood.

During the past winter, the section held their monthly indoor meetings as usual under the presidency and guidance of the Rev. C. H. Waddell, whose devotion to the interests of the section the Committee gratefully acknowledge. The *Cyperaceae* was the branch mainly studied, and to this department special attention will be directed in the field work of the coming session.

During the past year efforts have been made to improve the arrangement of the specimens in the Club's herbarium, but the success of these efforts has not been so satisfactory as could be wished for, owing to the want of suitable accommodation in this respect; but we hope through the co-operation of the General Committee in providing a suitable cabinet to get over this difficulty shortly.

ALEX. MILLIGAN, *Hon. Sec.*

REPORT ON COLLECTIONS SUBMITTED IN COMPETITION FOR PRIZES OFFERED BY THE CLUB.

For prize 1 "Mr. Joseph Malcomson has sent in a collection of Irish plants consisting of 284 species. These specimens are well selected examples, beautifully mounted, and illustrate in the very best manner the species represented. We consider this series highly creditable to the collector, and we have pleasure in awarding this prize to Mr. Malcomson.

For prize 9 "Miss S. Blackwood sends in a collection of Liassic fossils consisting of 25 species from the Lias of Islandmagee. We consider this collection satisfactorily complies with the conditions, and we accordingly award this prize to Miss Blackwood."

PROCEEDINGS.

SUMMER PROGRAMME.

FIELD MEETINGS.

20 May.

A R M A G H.

The Members of the B.N.F.C. held their first field meeting for the year at Armagh. On arrival the party at once proceeded through the city and on to the celebrated Navan Fort, or Emania, the pre-Christian residence of the Kings of Ulster, whose occupation extended down to the fourth century of the Christian era. Overcoming the difficulties of the steep and slippery ascent, the entire party assembled on the green plateau forming the upper portion of this ancient monument which covers about 13 acres of ground. The noble prospect, extending for a radius of very many miles all round, commanded first attention. Undulating hills, winding streams, cultivated fields, towns, hamlets, and villages, combined to enhance the beauty, variety, and interest of the scene, and to demonstrate the wisdom of the ancient Irish chiefs who selected this site for the residence of their kings and the stronghold of Irish Paganism. Looking directly to the east, the ancient Christian city of Armagh comes prominently into view, its appropriate and most conspicuous features being its two cathedrals, both for the same object and lighted up by the same sunshine, which helps to discover their differences—the one bright, cheerful, and anticipating a future, the other solid, dignified, and subdued, as by vicissitudes of time, and the effects of fire and sword that so often desolated the city.

A formal meeting was constituted, and Mr. John Vinycomb, M.R.I.A., was elected Chairman for the day. The arrangements for the day were announced, some new members were elected, and a discussion took place as to the desirability of inviting the British Association to Belfast at an early date.

The Chairman delivered a short address, referring to the historic events suggested by the surroundings, and the long line of kings, chiefs, warriors, and poets that peopled this ancient stronghold for so many centuries, exciting the envy and opposition of even the chief King at Tara until finally Cimbaoth, King of Ireland, induced the brother Collas to war against and utterly defeat Fergus Fodha, King of Ulster, under promise that the lands of that kingdom would become a territory for them and their posterity, thus anticipating by eight centuries the policy of the King of Leinster, who induced Strongbow and his venomous followers to invade Ireland.

The meeting was then addressed by Mr. Richard Pillow, a local antiquarian, well versed in archæological, topographical, and folk-lore subjects, and a practical investigator as well as original discoverer of matters connected with the ancient history of Armagh. He rendered the party most efficient service during the entire day by his prompt and interesting answers to every question put him by the inquisitive members of the party.

Leaving Emania, an adjournment was made to the adjoining quarries, which were successfully explored for the characteristic fossils of the locality. A member of the geologic section called the attention of the members to the marked difference between this exposure and what is found in Antrim. At Armagh we have the Lower Carboniferous limestone very well represented, but thousands of feet thick of the Middle and Upper Carboniferous, including the entire coal measures, are absent, and the Lower Carboniferous rocks are capped by a very curious and interesting brecciated limestone of the lower Permian age, the position and origin of which suggests a very wide field for investigation.

Unlike the plastic boulder clay of Antrim, the limestones of Armagh are covered by a drift deposit composed almost entirely of angular fragments of flint and chalk from Antrim. Some of the finer material was collected and examined microscopically by a member, and an important find of four species of foraminifera suggested, if not demonstrates, that the deposit had a marine origin, similar to that of the more plastic boulder clays of Antrim and elsewhere, as proved by the investigations of Mr. Joseph Wright, B.N.F.C.

Returning to the city of Armagh, a visit was paid to St. Patrick's Well and the Callan Water, a stream often referred to in the annals of Ireland. The party next visited the abbey in the Palace grounds, and then walked on to the very interesting museum of the Armagh Natural History Society, where, under the guidance of the Society's efficient Secretary, the members of the B.N.F.C. found an excellent collection of natural history and antiquarian objects of special interest. The Chairman pointed out the important and valuable collections of seals, and made some suggestions as to their arrangement.

Walking on the observatory, the party were very cordially received by the chief astronomer, Dr. Dreyer, who conducted the members over the premises and explained the nature of the instruments and the methods of making astronomical observations.

Next a visit was paid the Roman Catholic Cathedral, where a very courteous and intelligent officer, by the kind direction of Rev. John Quinn, P.P., gave the history of the building, and pointed out its prominent features and contents.

It was intended to visit the Armagh Library, but the time for closing had arrived, so the members of the B.N.F.C. had to end their interesting tour of inspection with a visit to the old cathedral, where the subject that excited most attention was the condition of the old stone crosses, fragments of which are found above the cathedral.

After a very acceptable tea at the Beresford Arms, the Chairman again constituted a formal meeting, at which the

events of the day were discussed. Mr. Gray, who acted as conductor for the day, in grateful and approving terms referred to the kindness and willing co-operation rendered by the respective authorities whose permission was required for the purposes of the day's meeting. The hotel accommodation and the means of transit were all that should satisfy the local branch of the 'Tourists' Development Association. The conductor, having tendered the Club's thanks to Mr. Fanning, the Secretary of the Natural History Society, made some suggestions as to the museum and the desirability of having a typical collection of local fossil fish remains, and proposed the following resolution, which was passed unanimously :—"That this meeting having noticed the neglected condition of what now remains of the ancient sculptural stone crosses of Armagh, it is desirable that steps should be taken to have the crosses re-erected and restored, and that the B.N.F.C. should initiate the movement at an early date." Mr. Fanning suitably responded to the expressions of thanks to the local authorities, and promised, on behalf of the Natural History Society, to give the suggestions of the Club their very best attention.

10 June.

CARGAN AND DISTRICT.

On Saturday, 10th June, the members of the Club had their second field meeting of the session at the hill-foot of Lurigethan, County Antrim, a district of the greatest interest to naturalists, historians, and artists. Leaving the railway carriage at Retreat, the large party proceeded on foot up the slope and on to the great ridge that separates the Valleys of Ballyemon and Glenariff. A walk of about a mile on the ridge brought the party to the ancient earthworks that constituted the important hill-foot at the extreme end of the ridge, which rises abruptly from the coast line, and appears from below a truncated cone, 1,154 feet high.

From this elevated point a most magnificent view is obtained over land and sea.

To the geologist this point of view is of special interest, not only from the varied features of physical geography that it presents, but from the marked difference between the geological structure of the district to the north and the area under view to the south ; for, whereas the district to the south, with the construction of Lurigethan itself, is built up with the same geological formations of the secondary period that constituted the main structure of Antrim, and are displayed in the escarpments of Cave Hill and the eastern coastline, the rocks on the northern area are mainly primary rocks, mica schist, and primary limestone much older than any other rocks in Antrim and Down, and more nearly related to the rocks of the opposite side in Scotland, a relation that opens up a chapter of inquiry of the greatest interest.

To the antiquarian the fort of Lurig must be of special interest, not alone for itself as the stronghold of the chieftains of the glens, when as Scots they joined the Picts in resisting the Roman advance in North Britain, but also because of the number of events and variety of ancient monuments called to remembrance by the prospect enjoyed from this spot. Away to the north can be seen Carnanmore and Carnbeg, overlooking the Moyle, the roar of its waters being silent and its surface shimmering in the sunshine. Nearer, north of Cushendun, we have the two cashels of Tornamoney; nearer still the venerable ancient altar at Inispollan, in the Valley of Glendun; then the old church at Layd and to the west of it, on the slopes of Tievebullagh, the remains of Ossian's grave, the cromlech at Cloghs, near Cushendall, and the place of assembly for the good folk on the crest of the conical Hill of Tieveragh, where on midsummer eve they have been seen here holding high festival in full dress.

The area just described is also the theatre upon which was performed the last great act connected with that most remarkable Irish chief, Shane O'Neill, and the termination of his

conflicts with the Macdonnells. In 1575 Shane O'Neill marched from Southern Down to give battle to the Scots of Antrim, who, lighting up the hills above referred to, made signal to the men of Cantyre for aid to meet the coming conflict. James Macdonnell and his brother Alexander Oge responded. James arrived first, and, landing in Cushendun Bay, was joined by Sorley Boy, who was chased from Red Bay Castle by Shane O'Neill, who had destroyed the castle, of which the ruins still remain overlooking Red Bay. Both forces met on the western side of Knocklayd, in the Vale of Glentow, and a bloody battle ensued. O'Neill fully avenged his recent defeat, and almost completely destroyed the Scots. James Macdonnell and his brother Sorley were taken prisoners. James died in O'Neill's dungeon, but Sorley lived to be avenged. Shane O'Neill, having thrown off his allegiance to the Queen and the authorities of the Pale, resisted for some time the combined forces of the English and Scots. He at length made overtures to the Scots, and an alliance was established, which was formally celebrated by a grand banquet at Cushendun, where, excited by wine, a dispute arose, the result of which was Shane O'Neill was murdered by the Scottish Redshanks, and thus was closed the eventful career of a proud and accomplished Irish chief.

The botany of such a region must always be interesting to those who care for native plants. It is still too early in the season to judge of the full wealth of the local flora, but some good plants were obtained. The lesser tway blade (*Listera cordata*) was, by careful searching, found on the open moor, where also the spike rush (*Eleocharis multicaulis*) was met with in abundance. On the return the bladder fern (*Cystopteris fragilis*) was gathered in plenty by the Cushendall Road.

The Club's meeting at Lurig was presided over by Mr. John Vinycomb, M.R.I.A. Business matters were discussed, new members elected, and one of the hon. secretaries, who acted as conductor, pointed out the special natural and historic features of the locality and reported the results of recent observations

in natural history by members of the Club. At the close of the formal meeting the party returned by the Ballyemon Glen Roads to Parkmore, where an improvised tea was enjoyed before the train's departure for Belfast. The thoughtful courtesy and generous kindness of the railway staff added much to the pleasure and complete success of the day.

24 June.

DUNDRUM.

The third field meeting of the session was held at Dundrum Castle, and was attended by a large number of members and friends, whose explorations on the occasion proved what an amount of interest can be thrown into an afternoon ramble. The formal meeting was held on the top of the donjon keep, and was presided over by the President of the Club. After the election of members and transaction of some formal business, one of the members gave a description of the main geological features of the district, embracing volcanic, metamorphic, sedimentary, and æolian rocks. From the castle keep of Ruray's Fort there is a commanding view of the bay, anciently known as Lough Ruray, frequently referred to in the earliest annals, and the scene around which were enacted many of the most important historical events of early Ireland, and about which modern writers have had many a wordy contest, particularly about the reputed landing of St. Patrick, as described in the "Book of Armagh," compiled about A.D. 807, and other ancient writings.

Serious conflicts of opinion have originated owing to the vague topographical references in the early lives of the saint. Some writers contend that Patrick landed in Dundrum Bay, while others maintain that he landed in Strangford Lough. The late J. W. Hanna, of Downpatrick, published a paper on this subject some forty years ago, in which he balances the

divergent opinions, and comes to the conclusion that the real landing-place of St. Patrick was on the shore of Strangford Lough, just below the village of Raholp, and not far from the present Church of Saul, on the site of the original church founded by St. Patrick.

Since 1874 the sand dunes of Dundrum Bay have been the happy hunting ground of antiquarians, and many thousand vestiges of early man in the shape of broken flints, pottery, &c., have been collected here. These forms are probably of the pre-Celtic origin. The late Dowager Marchioness of Downshire, as well as the present Dowager, were among the most active investigators in this field, and the family seaside residence at Murlough contains a most valuable and varied collection of the typical form, mainly collected by members of the Downshire family.

The site of Dundrum Castle, as its name (the ridge fort) indicates was one of the Celtic Hill forts, and as in many other cases was adapted by the Anglo Normans to their own requirements. The character of the structure was in accordance with the style of fortress built by the most skilled Norman military engineers of the early part of the thirteenth century. Full particulars relative to this castle are given by Mr. J. J. Phillips, architect, in a paper published by him in 1883. (See proceedings of the Royal Historical and Archæological Association of Ireland, Vol. VI., Series IV.)

After exploring the castle and its surroundings the party split up into different sections, each taking up its own subject for investigation. Some members explored the sand dunes, and collected several worked flints, flakes, scrapes, and pottery; another division visited, sketched, and photographed the cromlech and standing stone at Sliddyford, also the round tower and ancient church at Maghera. The grand outline of the Mourne Mountains looked its best, and Slieve Donard, the last visiting place of the first Firbolg, King of Ireland, stood out conspicuous in the slanting rays of the setting sun, when the party returned to meet their fellows at the hotel. As

they arrived in animated groups, the botanists had clearly the advantage in the bulk of their collections, for each came laden with a profusion of bloom so characteristic of the season. The district in the vicinity of Dundrum has time after time been visited by botanical explorers. It has a rich and interesting flora, yielding several plants which are either unknown or very rare elsewhere in the North-East of Ireland. The rock-cress (*Arabis hirsuta*) was found in some quantity at the Castle. It is 102 years since Templeton, the pioneer of Northern botany, first noted this plant on the walls of Dundrum Castle. It has persisted in this place ever since, though not found elsewhere in the county. An interesting, though not at all conspicuous, plant found in the pond near the castle was Syme's variety, *Moorei* of *Apium inundatum*. The specimens here were quite characteristic. In the short time available a good number of scarce plants were picked up. Amongst these may be mentioned the musky storksbill (*Erodium moschatum*) and the much smaller but not at all common *Erodium maritimum*; also the white campion (*Lychnus vespertina*), Viper's bugloss (*Echium vulgare*), hound's tongue (*Cynoglossum officinale*), &c.

11, 12, 13 July.

DUNGIVEN.

The members held their fourth field meeting on the 11th, 12th, and 13th July in Dungiven and the Valley of the Roe, an important portion of the ancient territory of Ciunachta or the O'Cathan country. They made Limavady their headquarters, and accordingly proceeded thence by the Northern Counties Railway, and were received at the Alexandar Arms Hotel with no small share of that "welcome to Limavady" that was so conspicuously proclaimed by banners and decorated arches along the broad street from the railway to the hotel.

At Roe Park the party were met by the proprietor, Mr. J. E. Ritter, and his amiable lady, who very kindly conducted all

to the summit of the reputed Drumceatt, where a great national Assembly was held A.D. 575. A better point could not have been selected for the Belfast naturalist to get a panoramic view of the proposed field for their three days' survey; indeed every lover of our country should appreciate the advantage of such a prospect, in which the varied physical features in view are so attractive, and the historical associations connected with the district are so eventful and romantic.

At this spot the formal field meeting was constituted, and Mr. John Vinycomb, M.R.I.A., was elected Chairman.

From this hill as we look to the east we have Innisowen Mountain, Lough Foyle, and the flat Valley of the Roe to the left hand, and away to the right the hills of Derry, Tyrone, and Donegal, with Dungiven on the higher reaches of the Roe Valley, and right in front of us we have the mountain and escarpments that form the western limit of the great northern basaltic plateau. The very broken outline of Binevenagh to the north, and in succession southwards Keady Hill, Boyd's Hill, Donald's Hill, and Benbradagh, the intervening space from the bed of the Roe, gently rising to the base of the hills, being geologically constructed very much like the section from the bed of the Lagan to the crest of Divis or the Black mountain—with this important difference that in the Lagan Valley the carboniferous rocks are absent, whereas in the Roe Valley there occurs in ascending order the Silurian, the Carboniferous, the New Red Sandstone, the Cretaceous, and the basaltic rocks. Like the Valley of the Lagan the Upper Roe cuts through the new red sandstone, and it is owing to this that the water of the Roe gets its red colour, from which it is named the Roe.

The great valley is very remarkable for its numerous indications of the oscillations that took place in the level of the land surface distributed over the valley. These oscillations marked the end of the Tertiary period, and possibly continued after the appearance of man. Without going into a minute analysis of the relationship between the existing deposits of gravels, clays, &c., one example will probably illustrate the point.

At Burnfoot, in Bovevagh parish, fully eight miles from the mouth of the Roe, and about 400 feet above the waters of the Foyle, a bed of clay occurs, which contains organic forms almost identical with the forms now living in the Foyle. Many of them are the same, but the general character indicates that the deposit was not laid down under the same conditions as the clay in the Foyle. A member of the Field Club has microscopically examined two samples of clay, one from the station at Limavady Junction, where the clay is estuarine, and the other sample was taken from the section at Burnfoot, at the higher level of 400 feet; both are proved to be estuarine, the higher deposit must have been laid down in a sheltered bay near the shore, as is demonstrated by the character of the foraminifera it contains. The sample from the Junction yielded 140 species. The Burnfoot sample only contained 32 species, limited to the following genera :—Miliolina, Bulimina, Nonionina, Polystomella, Bolivina, Lagenella. The number and size of the individuals of these very beautiful organisms may be gathered from the fact that one ounce of the washings contained 1,440,000 individuals. This examination was made by Mr. Joseph Wright, F.G.S.

The historic associations connected with the valley under view are of great value. It was the country of the O'Cathans, whose founder was grandson of Niall of the Nine Hostages, monarch of Ireland in the beginning of the fifth century. Roderic MacManus O'Cathan was the last of the race that ruled these lands from the eleventh century. He followed the standard of Hugh the last Earl of Tyrone, in the fatal insurrection against Queen Elizabeth, and thereby lost his position. His castle was built on the right bank of the Roe, near the Dog's Leap or Limavady, to be referred to presently.

Another great Irishman connected with this locality was the famous Columba. Like O'Cathan, Columba was descended from the Royal race of Ulster. According to the testimony of the Duke of Argyll, "Columba was an agent, and a principal agent, in one of the greatest events the world has ever seen—

namely, the conversion of the Northern nations." In the Duke's book on Iona he has published the best account of Columba. The high esteem in which he was held by the native Irish in his day is proved by the invitation he received to return from Iona to Ireland to preside at the great Convention of Drumceatt, when important matters of dispute were to be discussed between the chiefs and bards. Considerable differences of opinion are held with reference to the exact site of Drumceatt, some holding that it was on the right bank of the Roe, and others that it was on the left. At the Naturalists' meeting the matter was freely discussed, and the general opinion was expressed in favour of Daisy Hill, adjoining Roe Park.

Leaving the hill the party were very kindly conducted through Roe Park by Mr. and Mrs. Ritter, whose knowledge of the locality conveyed in the most acceptable manner added very much to the pleasure of the party. O'Cathan's Rock and Castle were visited, and the very best views of the fine scenery of the River Roe was pointed out; and, coming to more matter-of-fact subjects, Mr. Ritter explained how he has succeeded in making use of the water power of the river to generate the electric power which is now used to work manufacturing machinery in Roe Park, and to light Roe Park House and the town of Limavady.

After leaving Mr. and Mrs. Ritter the Naturalists walked on to Carrick Rocks, a very fine gorge cut out of the Silurian rocks by the River Roe. The banks at each side are about 60 feet high, and give capital sections for study. The surrounding plantation about the rocks and up the sides of the ravine, with the dark waters of the Roe at foot, form a combination of romantic scenery well worthy of the artist's pencil, and, with its variety of animal life, birds, fish, and insects, is a very paradise for the Naturalists.

Being now four miles from headquarters, cars met the party for the return journey, calling at Ardmore, where Mrs. Macrory, with a generous hospitality, entertained the explorers

in a beautiful Swedish chalet, constructed on a site that commanded a most pleasing prospect. The kindly consideration and attention of Mrs. Macrory and her family made a very agreeable break in the day's programme. By invitation of Mr. J. C. M'Causland, a visit was paid to Drenagh, where Mr. M. M'Causland conducted the party to the old church of Drumachose, and pointed out the reputed grave of Fin M'Quillan. This chief was killed in a battle with the Macdonnells.

The party then returned to the hotel for dinner, after which a walk was taken to the old fort on the Derry Road, which gave the opportunity of seeing one of the most gorgeous and brilliant sunsets that poet could imagine or a Turner depict, and thus finished our first day's work.

On Wednesday morning the Naturalists left Limavady by rail for Dungiven. Here they were met by a number of local friends, who were most anxious to aid in every possible way. Dr. Moore, of Dungiven, and Mr. J. Eakin, of Feeny, rendered special service. The latter gentleman attended the party for several hours, and his intimate knowledge of local antiquities and topography was invaluable to the party. Moving off in the well horsed vehicles of Mr. Magee, Mr. Eakin conducted the Naturalists to Banagher, where a survey was made of what remains of a vitrified fort—one of the very few that occur in Ireland, although they are so numerous in Scotland. Unfortunately a former rector of the parish had the main structure removed in making what he considered "improvements" about his grounds.

Proceeding up through Templemoyle, where a variety of plants of special interest occur, ferns and other native flora were collected, and reaching the top of the hill, a visit was paid to Auglish stone circles, of which there are several. One is quite complete, and composed of about fifty stones about $2\frac{1}{2}$ feet high. Others were more or less complete, and all were most interesting examples of this form of ancient monuments. Returning by the road, the cars were sent to the proposed rendezvous at Carniban, at the north end of the Valley of

Lignapestia, while the Naturalists walked through from the south. This well-wooded ravine, with its mountain torrents, waterfalls, and rocky banks, is reputed to be the place selected by St. Patrick for the destruction of the last of the Irish serpents, and the pool below the waterfall is the resort of pilgrims, whose votive offerings may be seen attached to the trees that overhang the pool. The banks about the pool are clothed with the beech fern and numerous other forms. An excellent section of primitive limestone also occurs here, traversing the metamorphic rocks, and good specimens were secured, as well as very fine examples of quartz, which occurs sometimes in very large crystals, and is known as Dungiven diamonds. After a rest and slight refreshment at Carniban, or the White Carn, a visit was paid to Banagher old church, said to be built by St. O'Heney, whose monument is in the graveyard, and is celebrated for the remarkable virtues of the dust collected around it when collected by a member of the O'Heney family. The ruins, remarkable in many respects, are in charge of the Board of Public Works.

Returning to Dungiven the party visited Pellipar House by the special permission of Captain R. A. Ogilby, D.L. While there are many natural attractions throughout the grounds and the surroundings of Pellipar House, the very fine collection of pictures in the house are of the most interest and value. They are distributed through the several elegant apartments with great care and judgment. The walls of the billiard-room are decorated with a choice collection of engravings. There are over one hundred examples in oil, comprising works of the chief Italian schools, the Dutch, and Spanish, as well as some English masters. There are some works attributed to Titian and Tintoretto amongst the Venetians, Marratti and others of the Carracci school, and some minor representatives of Italian art. The Dutch are represented by Brengel, Vandervende, Vanderkeef, &c. Two works are attributed to the great master of the Nuremberg school, Albrecht Durer, and there is a very important Morillo, giving a good idea of that Spanish

master, who excelled in painting angels and children. Of English works perhaps the best are a fine landscape by Clover and a marine piece of G. Morland.

From Pellipar the party went on to the old church of Dungiven. On entering the graveyard there is a good example of the bullaun, which is here venerated as a holy font or well, and the surrounding bushes are liberally decorated with votive offerings in the shape of rags, strings, and coloured pieces of cloth.

The church is supposed to have been founded by one of the chiefs of the O'Cathans about A.D. 1100. The principal feature now in the old building is the tomb of Coo-eya-gall, whose death is recorded thus A.D. 1385 :—"Cumiaghe O'Kane, Lord of Oireacht-ui-Cathain. Died at the pinnacle of wealth and celebrity." The monument therefore cannot be older than the latter part of the 14th century. Its restoration some few years ago has detracted from its interest, as all the figures on the base of the monument are recut to imitate the old work. Below the site of the old church, and at the side of the River Roe as it tumbles down from Benady Glen, there is a rock with the apparent impression of a foot, attributed to St. Patrick, and therefore it has become an object of veneration. Surrounded as it is by most picturesque scenery, no better spot could be selected for the exercise of devotional feelings and the worship of the God of nature.

Returning from the venerable and venerated ruins of Dungiven old church, a glance at the standing stone, and a hurried visit to St. Patrick's Well completed the events of the day before catching the evening's train back to Limavady and the homely car of Mr. Sloane.

On Thursday morning the members of the Field Club started by train from Limavady for Dungiven, where they were received by Dr. Moore and others as cordially as on the morning of the day before. They at once proceeded to the residence of the Rev. S. Thomson, where that gentleman's very fine collection of geological specimens were arranged for

inspection. As a local collection they are of the greatest interest, and very fully illustrate the fossil contents of the rocks in the locality. They are chiefly of the Cretaceous or chalk formation, of which the section on the slope of Benbradagh, over the town of Dungiven, is the most western escarpment in Europe, and represents a formation that occurs in a more or less continuous band from thence through Europe into Palestine. The quarries on Benbradagh are the most fossiliferous chalk rocks we have in the North, and the variety of the species is very remarkable. On this point, however, the number of species of fossils or plants credited to any locality depends very much on the zeal and skill of the collector, qualities that distinguish Mr. Thomson, and hence his collection is as remarkable for the number and variety of the species as for the great number of individual specimens of some species. The Sponges, Echinodermata and Cephalopoda are exceedingly abundant, and many of the less known forms elsewhere are numerous here.

Mr. Thomson was good enough to accompany the party up to the quarries on Benbradagh, where a considerable number of specimens were collected. In ascending the hill from the plain below the Carboniferous Triassic and Cretaceous rocks were traversed, and all were capped as at Cave Hill, with the Basaltic rocks. A walk of about a mile on the crest of the hill enabled the party to reach, by a gradual slope, the highest point of the mountain 1,536 feet high.

From this point there is a most extensive view, and as the atmospheric conditions were most favourable every feature of the grand panorama was distinctly visible, Errigal and Muckish in the North-West of Donegal, Knocklayd and Sleamish in Antrim, the Mull of Cantyre, and the mountains of Down and Tyrone; while the wide stretch of country between, with towns, hamlets, mansions, and farms, looked like a carpet of green and an unbroken flat. The details of ridges and hollows, hills and valleys, were all subdued in consequence of the superior elevation of the point of observation.

This was the grandest view enjoyed during the trip, and very appropriately terminated the Naturalists' meeting at Dungiven, a locality well worthy the attention of tourists in general.

12 August.

T O O M E .

Lough Neagh is an expansion of the River Bann, and occupies a remarkable depression in the great northern basaltic area of Ireland at the level of about eighty feet above the level of the sea. The lake and the Lower Bann, that drain it, thus cut the basaltic area into two distinct regions, now known as the County Antrim and the County Derry portions, which in ancient times were known as the Dalriadic principality, on the right hand of the river; and the Great Fir-Li, of the Hy-Nialls, on the left. The portions of the districts fringing the river were in early times thickly wooded, and, the river being the dividing line, was the scene of the main battles between the neighbouring chiefs, and many a renowned Irish warrior fell by the banks of the Bann, particularly at the fords, of which there were several between Lough Neagh and the sea, or "Inver Glais," where the wave of Tuagh was heard.

Of the many fords on the Bann none were more renowned than "Fearsat Tuama," the ford of the tumulus, so called no doubt because in early times there existed in the locality a mound or tumulus, marking the spot where some chief was buried, and it is from this circumstance that the place is still called Toome.

It is very frequently mentioned in the ancient annals of Ireland. For example, the Four Masters state at A.D. 1181—"The men of Moy, Ithe, together with Eachmareach, O'Cathain, and the Cinel-Binnigh of the Valley, mustered an army and crossed Toome. They plundered all the territories of Hy Tuitre and Fir-Li, and carried off many thousands of cows."

Sixteen years after this event Sir John De Courcy came north, plundering and desolating the country. He erected a castle at Kilsanctan, by the Ford of Eas-Craiobbhe, or the Salmon Leap, near Coleraine, and his followers built a similar castle at Fearsat Tuama, the foundations of which are still traceable in the garden of Toome House, the residence of Mr. James Grant, J.P. Unfortunately there are no remains now above ground ; the gateway and other portions that remained longest were entirely removed during the drainage operations carried out by the Board of Works.

During these operations several thousand flint and stone implements were taken from the Bann, as well as many forms of bronze weapons, shields, swords, spears, &c. The abundance of flint implements was most remarkable, and, with the variety of the other forms of antiquarian objects collected here, go to prove the ancient importance of this station and the many stirring events that occurred around it. The supply of antiquarian objects is not yet exhausted, for the members of the Field Club party collected worked flakes. A typical set of the worked flakes from Toome and eighteen or twenty other stations have been recently acquired by the City Museum Committee.

After his chat about the history and importance of Toome Ford, the conductor directed attention to the timber structures constituting the Toome Fishery Station, and, being constructed on piles and wattle work in the centre of the river, illustrated in a most effective manner the primitive lake dwellings of Switzerland and other countries, which were built with open timber framework, and not as solid accumulations in the water, like the crannoges or lake dwellings of Ireland.

Leaving the Castle, Fishery, and Temple of Liberty behind, the party were conducted by Mr. Grant over his Kieselguhr Works near the hotel. The well-known Bann Clay is now known in commerce as Kieselguhr, and is used for a great variety of economical purposes, chiefly through the practical skill and enterprise of the Messrs. Grant, of Toome. The

conductor gave a description of the clay at the works, from which we learn that this very fine, pure white clay occurs in large quantities on both banks of the Bann for several miles along its course, and for a considerable distance inland over the flat country around Toome. The thickness of the deposit varies from two to six feet thick. The clay is a pure silicate of alumina, the average analysis being as follows :—

Silica	...	...	...	72 per cent.
Alumina	...	...	...	9 " "
Iron oxide	...	...	...	5 " "
Lime	...	...	...	1 " "
Water and organic matter...	...	...	...	13 " "

Its specific gravity is about 0.5422, so that when dry it will float on water like peat. It is a non-conductor of heat and sound, and may be made into bricks which will float in water. It is used in the manufacture of dynamite and polishing preparations, and for a variety of purposes on board ship and public structures, where its extreme lightness, fireproof, deafening, and non-conducting properties renders it so valuable. It is prepared by Messrs. Grant in various conditions, but chiefly in bags of pure white powder of the very finest texture. Although so very highly silicious, it is of a vegetable and not of a mineral origin ; it is in fact made up of the silicious cases of extremely minute single-celled plants, such as are at present lying in and around the Bann. The plant organisms are known as diatoms, the most abundant, indestructible, varied, and beautiful forms known in the organic world. A cubic inch of the earth would probably contain 70 million separate organisms.

The Club party congratulated Messrs. Grant upon the result of their labour, and very heartily wished them all the ultimate success their manifest skill and enterprise so clearly merits.

A number of well-appointed boats were now provided, and, after a most enjoyable row of an hour on the brilliant water of the Bann, all were safely landed on Church Island, where the church, holy well, bullaun, and many other attractions of the

islands were fully explored, and the return journey was as pleasantly accomplished, the interval being fully filled up by the discussion of many interesting subjects of natural history suggested by the surroundings, and practically illustrated by the local knowledge of the boatmen in charge, who freely accepted the naturalists' view on most matters of detail, but would not admit that eels had scales, although the Naturalists gave a microscopical demonstration of the fact.

The eel-fishing is one of the most important of the local industries at Toome, where eels are taken by the ton during the season, and are sent on by rail to the various markets, chiefly in England.

The district is one of the very best for the Naturalist in search of freshwater mollusca. On this occasion some fifteen species were collected, including the scavenging *Limnea stagnalis* and *palustris*. Some large forms of the bubble snail *Physa fontinalis* were captured. Of the coil shells, *Planorbis marginatus* was very abundant. This shell, so like the fossil ammonite in form, has, like that family, the power of exuding a coloured fluid under irritation.

The mud-loving *Pisidium amnicum* was plentiful about the roots of plants in muddy bottoms.

On the shores of the river and at Church Island the beautiful amber shell *Succinea elegans* was collected, with several other land shells.

Many of these small and delicate shells are of very ancient lineage, their family history extending back far beyond the Norman or Roman or Celtic races, for they are recorded in long past geological time. The very abundant occurrence of dead shells in the Bann at Toome, between the county and railway bridges, illustrates the origin of the Purbeck limestone used for the decoration of our finest cathedrals and parish churches. This limestone or marble is almost entirely composed of the freshwater shell paludina. The district around Toome is botanically rich, the constituents of its flora being numerous and interesting, especially as regards aquatic and

sub-aquatic plants, sedges, and pondweeds. An exhaustive collection could not be made in as many days as the party had hours at their disposal, and yet the botanical members secured fine examples of the rare water starwort *Callitricha autumnalis*; also the rare pondweed *Potamogeton heterophyllus*, a curious attenuated form in good condition. Fine fruiting specimens of *Potamogeton luceus* were abundant, and quite a mass of *Chara aspera*. At the northern end of Lough Beg such plants as *Potamogeton perfoliata*, *Alisma ranunculoides*, and *Leonurus europæus* were everywhere. Of land plants the most important was *Spergularia rubra*, which in the North of Ireland may be accounted decidedly rare. The submerged water plants were found to be almost entirely encrusted with diatoms such as make up the bulk of the Bann clay or kieselguhr.

After the investigations of the day under a broiling sun it was an agreeable experience to reach the Duneane Rectory, the residence of the Rev Mr. and Mrs. Fahy, who most cordially welcomed and as hospitably entertained the almost exhausted party of some sixty members, who, rested and refreshed, were further entertained by a short address from Mr. Fahy, giving a most interesting account of the parish and its immediate surroundings, including its archæology and natural history. Adam Speers, Esq., B.Sc., acted as chairman of this formal meeting of the Club, which directed that a letter of condolence be sent to Mr. W. J. Browne, M.A., on his recent sad bereavement, so very deeply regretted by the Club, and, after the transaction of some other formal business, a most hearty vote of thanks was passed to Mrs. and Mr. Fahy, and then the party returned to Toome to catch the last but much too early train for Belfast at 5.7 p.m.

2 September.

BALLYNAHINCH.

The last field meeting of this Society for the year was held at Ballynahinch, and was attended by a goodly number of

members and friends. The first item of the programme was an open country walk to Glassdrummond—the green ridge—which is crowned by a good example of a cashel or stone fort. This structure encloses an oval space measuring about 105 feet, the enclosing wall being formed of small stones, loosely built, with a maximum thickness of 10 feet and five or six feet high. No doubt the wall was originally very much higher. There are several similar cashels in Antrim and Down, and they may be classed with those ancient cashels or stone forts so highly developed on the Western Islands, off Galway, such as the very fine example known as Dun Ængus, on the Island of Arranmore. The ordinary earthen forts often have underground chambers, or souterrains, connected with them; the cashels have similar chambers, but they are formed in the thickness of the enclosing wall, and are entered by openings on the inner face of the wall. No such chamber has been traced at Glassdrummond; if there ever was a chamber, it is now unrecognisable. It is satisfactory to note that the owner of the farm is careful to preserve what remains of this cashel.

The party returned to Ballynahinch, noting natural and artificial objects of interest along the way, including the wayside grave of a person who fell during the contests of '98.


The members obtained permission to enter the attractive demesne of Montalto, which affords excellent opportunities for the study of many branches of natural history. The largest division of the party ascended to the fort of Edenvaddy—the Dogs Hill. This is a good example of the ancient earthen fort; it commands an extensive prospect, and was last used for warlike purposes by the rebels of '98 who fought at the battle of Ballynahinch.

Returning to Ballynahinch, tea was provided in an acceptable manner at Fitzpatrick's Hotel, after which a formal meeting was held, under the chairmanship of Mr. W. H. Patterson, M.R.I.A. Among the business matters transacted was a vote of thanks to the Rev. Patrick Quaile, whose extensive knowledge of the locality, very freely imparted, enhanced the

pleasure and profit of the afternoon's ramble. A resolution was also passed strongly in favour of inviting the British Association to revisit Belfast at an early date, as it is now twenty-five years since the last meeting, in 1874.

WINTER SESSION.

ANNUAL CONVERSAZIONE.

N the 1st November, the Annual Conversazione in connection with the Belfast Naturalists' Field Club, was held in the Public Library and Art Gallery, which had been kindly placed at the disposal of the Club by the Library Committee of the Council of the County Borough of Belfast. There was a very large attendance of the members and their friends, and the proceedings throughout were of a most enjoyable nature. From half-past six until eight o'clock tea, coffee, and other light refreshments were provided in the newsroom, on the ground floor. In the reading room on the first floor there was a general exhibition of objects of interest, chiefly connected with the members' investigations during the summer, the sections represented being geology, zoology, botany, ethnology, and photography. The exhibitors included Miss M. K. Andrews, Mrs. Patterson, LL.D.; Professor Symington, F.R.S.E.; Professor Johnson, Messrs. J. St. J. Phillips, B.E.; F. J. Bigger, M.R.I.A.; A. Speers, B.Sc.; R. Welch, J. H. Davies, Alexander Milligan, W. Gray, M.R.I.A.; W. Swanston, F.G.S.; J. Donaldson, J. Wright, F.G.S.; J. Lizars, R. May, J. Hamilton, Charles Bulla, R. Bell, O. P. Farran, W. H. Phillips, Alex. R. Hogg, W. J. Fennell, M.R.I.A.; and H. L. Orr. The last named won the Club's prize for a collection of British land shells. Mr. J. H. Davies exhibited freshly gathered mosses of different species, which are to be found in fruit at this season, and the fructification of these was examined with much interest under Mr. Gray's microscope. Mr. Davies had also on the table freshly collected tufts of rare forms of grasses lately detected by him on old

walls at Lisburn. Mr. Robert Welch displayed a well-arranged collection of land and fresh water shells and marine shells typical of the geological age known as the Jurassic. Rubbings of armorial stones from County Antrim were shown by Mr. Bigger, and Mr. Swanston exhibited some maps of ancient Ireland from 1520 to 1700.

At nine o'clock an interesting optical lantern demonstration was given, the various views being explained by Mr. Gray, Mr. Fennell, and Mr. Phillips. The lantern was efficiently manipulated by Mr. Hogg. The President of the Club, having in a few well-chosen remarks referred to the work done by the members during the past session, hoped their Winter Session would be very successful.

Mr. Gray exhibited some excellent photographs of man-eating lions from Uganda. These animals with others were shot by Mr. J. H. Patterson, and Mrs. Patterson, LL.D., had sent the heads and skins of two of these lions for exhibition at the *Conversazione*.

The arrangements in connection with the *conversazione* were excellently carried out by the Honorary Secretaries, Messrs. Wm. Gray, M.R.I.A., and W. D. Donnan, M.D.

13 November.

PROFESSOR HADDON, F.R.S.—“OUR PAPUAN
FELLOW-SUBJECTS AT WORK AND PLAY.”

Mr. F. J. Bigger, M.R.I.A., occupied the chair. Professor Haddon delivered a very interesting lecture on “Our Papuan Fellow-subjects at Work and Play,” which was a descriptive account from personal observation of a stage of culture such as no doubt prevailed in Ireland before the introduction of Christianity. The lecturer dealt with the work of men and women and the games of children, as well as the physical features of the country, the towns and villages, including Port Moresby, the capital of British New Guinea.

The manufacture of native pottery by women was very fully illustrated. This is altogether hand-made without a wheel, the result being very similar to the remains of ancient pottery dug from Irish graves and sand dune settlements, such as we have in our Grainger collection. The lecturer also illustrated and described the making of native canoes from logs of wood, dug out with stone implements and the action of fire, such as was probably the origin of the dug-out boats in the Benn collection of the Natural History Museum, Belfast. Our crannoges, or artificial islands, so common in Irish lakes, were illustrated by the native pile dwellings that occur along the coasts at Bulaa and elsewhere. The construction of these villages was described in an interesting manner, and demonstrated the correctness of the accepted theories as to the origin of our ancient Irish crannoges. The process of making fire by the friction of pieces of wood was shown, and the method of tatooing as practised by the women. A number of games of Motee children were illustrated, such as cat's cradle, leapfrog, tug of war, and several that have no British equivalents. The natives of these distant islands attribute to supernatural agency or to the mighty deeds of their legendary heroes all special natural features in the landscape, such as rocks, mountains, &c., and the legends are carefully preserved and recited, as is common in Ireland still in remote places. Native shrines were shown, which are erected to secure success in fishing and cultivation of crops of fruit. At these shrines native offerings were typically represented, as, for example, a basket of fruit was represented by a large shell holding a few stones, and, as in Ireland, upright stones of memorial frequently occur. Mr. Bigger, Chairman, Messrs. Wright, Gray, and Patterson discussed the merits of the lecture, referring to its many subjects of comparison with Irish customs in ancient times, and, on the motion of Mr. Wright, F.G.S., a very cordial vote of thanks was passed to Professor Haddon.

21 *November.*

PRESIDENT'S ADDRESS.

I have selected the "Work of the Club" as a suitable subject to bring before you this evening.

Since I addressed you last year we have lost a prominent and valued member of the Club, our late President, Mr. Lavens Ewart, who was called away in the Spring of the year. He took the greatest interest in our work, especially the archæology and ancient church history of our country, and we shall greatly miss his genial presence amongst us, and his ready sympathy and help in the promotion of every good cause.

My object now is not to survey what has been done in the past and report progress; when the end of the century comes next year we shall probably be flooded with reviews of the work of this century of all kinds. I hope amongst them we may have a history of the past work of the Club. My object to-night is rather to look forward and survey some of the ground which we hope the Club may be able to occupy in the coming century. Not to criticise what has been done, but to see how progress may be made, and how the various branches of the work of the Club may be developed in new directions to keep pace with the days in which we live.

The object of a Field Club is, I suppose, two-fold:—

1st., to promote the study of Natural History among its members by mutual assistance and encouragement, and also to try to popularise these pursuits by gaining new disciples.

2nd., to work out in detail the Natural History of its own district and place on record these observations, and in this way add to the sum of general knowledge.

We have no reason to be ashamed of the record of our Club. The oldest in Ireland it has lived to see the birth of similar societies in Dublin, Cork, and Limerick. It has had among its members some good Naturalists whose work is known beyond our own district, and who have made permanent contributions

to science. The Publications of our Club will compare favourably with those of similar societies. The number of members is large and well maintained year by year. While, however, we have a large roll of members, the working members form a *very small percentage* of the whole—smaller I fear than was the case in earlier days, and is the case in most other clubs. If we are to retain our reputation as a Club and complete the survey and cataloguing of the fauna and flora of the district every effort must be put forth to increase the number of workers in each branch of our studies.

We must endeavour especially to attract young people and imbue them with a real love of nature so that they may take up and work with energy and zeal some particular branch. In some persons the love of nature is innate, and will shew itself in spite of any hindrances, while others seem born blind to any sense of the world of beauty and interest without. In this connection let me refer to a new departure in the conduct of our meetings which may become a great means of usefulness. I mean the "Science Gossip" half hour before the meetings. Objects of interest, rare specimens, doubtful species can be shown, names and questions asked, but especially new members can then have the opportunity of becoming acquainted with those who can assist them in the special branch in which they are interested. I hope that this new departure may become one of the most valued and useful functions of the Club. To this end all must be unselfish, willing as the case may be to teach or to be taught.

In comparing the programmes of our winter meetings with those of kindred societies in England and elsewhere I am struck with one point of difference. We have not in Belfast so many short communications. Brief notes on some new species found in the district and its exhibition or on some fact of interest taking up five minutes each, several of which can be read as well as the chief paper of the evening, are of use in adding to the variety and bringing forward new members. The number of our contributors is too small.

When we compare the end of this century with the beginning nothing is more remarkable than the specialisation which has taken place in all branches of knowledge, and nowhere more than in Natural Science. Science has extended its bounds to such an extent that it is impossible for one mind to cover all the ground. Life is too short. For this reason men of science have of necessity become specialists, and the lament is again and again being raised and not without reason that the old race of Naturalists is passing away. Moreover the great improvement in appliances has contributed to the same result. The microscope has supplanted the pocket glass, the Laboratory and the Herbarium, nature's open fields, and the "Field Naturalist," a "House Naturalist."

I am not railing against progress but only against some of the evils which have accompanied it. The microscope, the scalpel, the prism, have added immensely to our knowledge and to the interest of every branch of Natural Science, and where this goes hand in hand with field work, and the specialist is careful to keep in touch with his fellow workers in the field and in other subjects, all is well. But we cannot but regret the passing away of the older type of Naturalist. Nay, we cannot let him go, for there is no reason why he should disappear altogether from the stage if in some necessary points he were adapted and modified to suit the requirements of the time.

The change I have described is acknowledged and deplored by many of our best men, and they say that our hope lies in the Field Clubs, and that the Field Clubs do a work in this respect which is unique ; they alone can save the older type from becoming extinct. Our Schools of Science at the Universities and elsewhere are turning out a new race interested in structure and physiology more than in systematic work. Naturally our professorships are filled by the new men, and unless our Field Clubs can gain recruits and train them in the older traditions it is likely the divorce between morphologists and systematists will become more pronounced as time goes on.

In these remarks I have had Botany chiefly in view, but they will apply with more or less force to every branch of modern science. Take an example. Compare 6 of our leading botanists of to-day with 6 of the leaders of 50 years ago.

Robert Brown	Vines
Henslow	Scott
Hooker	Bower
Charles Darwin	Francis Darwin
Bentham	Isaac Balfour
Babington	Marshall Ward

I will venture to say that any of the older men could have told you the names of most of the species of plants you would meet with in a walk. They were all round men. But I doubt if any one of my 2nd list could do so. In their own departments you would find each possessed of a more extensive knowledge than the older men, but the field of each would be much more limited.

Let me mention the names of three men whom we may take as types of Field Naturalists of the old school, John Templeton, William Thompson, and Robert Patterson. They were well acquainted with Nature out of doors, but neither did they neglect the literature of the subject, and their enthusiasm and accuracy of their knowledge and powers of observation placed them in the forefront of Irish Naturalists.

Templeton formed the scheme of embodying his encyclopædic knowledge of nature in a Natural History of his own country, but the scheme was never carried out (much to our loss). Two volumes of his *Hibernian Flora* in M.S. being all that remains complete of his great enterprise.

Thompson intended to do the same for Zoology in his *Natural History of Ireland*, but was only able to complete his 3rd volume on the birds.

Whatever might have been possible then we shall never again see the whole Natural History of a country attempted by one man, but there is a peculiar interest in the older books which is not found in those of more modern type. Compare

for instance Smith's *English Flora* with Boswell's *English Botany*, or Wilson's *Bryologia* with Braithwaite's *Moss Flora*, or Hookers' *Jungermanniæ* with Pearson's *British Hepaticæ*. The modern works are more complete in detail and minute, but not half so interesting or lifelike. They smell of the lamp and the microscope, not of the fields.

I hope what I have said will not be misunderstood. It is inevitable in these days that there should be specialists, both among amateurs and professional naturalists.

Anyone who wants to do any real work of permanent value must specialise to some extent and make himself master of some limited portion of the field, but this may be done, and has been done, along with a good general and practical knowledge of other subjects besides his own.

One department of Science is correlated with another in the most extraordinary way as we are finding out more and more everyday. It is only when the specialist forgets this and busies himself in his own subject, excluding other interests, that his work suffers, and he himself suffers from his limited view. While for some reason which I cannot quite explain we gain more instruction and learn more about the life of the woods and the fields of lake and river and sea from the best of the older books, no age except the present could have produced such books as Kerner's *Plant Life*. Although a specialist of no mean order Kerner von Marilaun has devoted many years to the noble task of popularising the history of the life of plants, and without losing interest on the one hand or pandering to popular taste or shallowness he has produced a work artistic instinct with life of entrancing interest. His sympathies are so wide, his illustrations drawn from every source, he seems to feel that the life of plants, connected as it is on every side with that of other races of beings, is an expression of the thought of one creative mind. He gives living interest to the most recondite and abstruse discoveries of modern botany by showing how every detail ministers to the life of the plant.

I will now sum up before passing on to speak of our work in

the district. If we want to accomplish our true work as a Field Naturalists Club we must have more workers who will take up definite subjects.

Let us not be dilletanti, taking a general interest in every branch, but knowing none accurately, too indolent to take the trouble and use the patience and application necessary to make up one subject thoroughly ; nothing can be acquired in this world that is worth having without taking trouble. People will attend lectures by the dozen and look at photos and lantern slides by the hundred, but unless they take trouble and work themselves they cannot learn anything thoroughly in this way, but will only have acquired a miscellaneous smattering of many things. What is learned easily is forgotten ; what is learned with trouble and gradually becomes a treasure for life.

I come now to the subject of our district. One of the most important objects of a Field Club is to carry out a detailed natural survey of the portion of country which forms its district.

We may divide Ulster into three portions—North-East, North-West, and Central. The N.E. Ulster, consisting of Londonderry, Antrim and Down, is our district. There should be clubs at Derry and Enniskillen for the other districts, but North and Central Ulster are left derelict, since there are, alas, more counties in Ireland than Naturalists to work them. In this case we in this club are in a sense responsible for the country beyond our own bounds, and efforts should be made from time to time by some of our 330 members to make incursions beyond our own bounds. These unworked districts would yield, I am sure, valuable results—e.g., parts of Donegal, Monaghan and Tyrone.

During the thirty-six years of our existence we have gone up and down through the land, and there are now few places of interest left which the Club has not explored. About 250 excursions have been made. Don't let us imagine, however, that the district is worked out. Far from it. For one reason

or another, for the most part from difficulty of access the following portions would still repay careful work :—

The Glens of Antrim—small portions here have been well worked, but not the whole. Lough Neagh—Its shores and islands, and also its waters for the fauna. The “County Down Lake District,” which lies N.W. of Ballynahinch, containing seven loughs—Aghery, Erne, Henney, Derry, Ballykine, and Bow Lough. A systematic survey of these, especially the fauna and water plants, with a boat for dredging, might afford good results ; and as regards marine fauna and flora, the same remark will apply to Strangford, Carlingford, and Lough Foyle. It would be easy to add to the list to show that there is still work to be done before we can say that the district has been worked out.

It is true that Club excursions have not been found to be the best opportunities for work, but they are invaluable as preliminary surveys of special districts when the best places can be seen and marked down for future detailed work.

It adds greatly to the value of an excursion if some definite object or objects can be placed on the programme to be carried out, as has been done on some occasions. Search for some special plant or shell or fossil which it is important to find again. In this way there are some old records we ought to set about investigating afresh. *Carex Baxbaumii* ought to be searched for in other suitable parts of the extensive shores of Lough Neagh, as it seems to be extinct on Harbour Island. Special search might be made in fresh places among the Silurian rocks of County Down for graptolites, by which the age of the beds are known.

Botanists have done more than either zoologists or geologists in publishing complete lists for separate localities. Why should there not be complete lists worked out and published in our Proceedings say of the birds in Tollymore Park, the shells of Colin Glen, or as regards the rocks, papers complete in themselves on particular rocks or beds with the fossils found in them.

I shall now endeavour to give a brief account of how far our

Club has succeeded in accomplishing its natural survey work in cataloguing and comparing the Fauna and Flora and rocks of its district.

The Club guide of 1874 gives an excellent summary of what had been done in each subject up to that year.

In Geology the field had been fairly well covered. The glacial question is receiving careful attention and it is hoped by working out the whole subject anew, in localities such as our own, and recording on a uniform plan the observations made, we shall arrive some time at a clearer knowledge of the history of the glacial period, and be able, for instance, to describe without gainsay how Co. Down was so formed as to receive its name of "County Up and Down." I think there is room for a Geology of N. E. Ireland—a handbook from which we might learn the chief facts about our own rocks with complete lists of the local fossils which had been found in each, or if this were too ambitious, what I have already suggested, papers in our Proceedings on some special rock or circumscribed natural area or district.

The Government survey may be very good but it is inconvenient and difficult of access. Why should there not be more convenient and popular sketches? A farmer in my parish asked me lately to tell him where such could be got and especially a good geological map of Co. Down and I could only refer him to the sheets of the government survey maps, which are beyond his reach and prohibitive in price.

In Botany, the flowering plants and ferns have been worked out and published with a fair approach to completeness, but some of the critical groups remain incomplete, and there is plenty of work, and hard work, still to be done at the Brambles and Roses, Willow herbs, Chenopods, Docks, Willows, Pondweeds, and Grasses. The mosses have been fairly well worked out but not so the Hepaticæ. There is a list of fungi in our Proceedings but the group is so immense that it might be greatly enlarged, but there is none of Algae, marine or fresh water, or of lichens, which is not creditable to our Club.

Materials exist to form a foundation and these at least should be worked up.

Turning now to the subject of Zoology little has been done in the way of publication since the issue of Thompson's Natural History of Ireland in 1856. I hope we may see some day, a list, worked up to date, of the land and fresh water shells.

In Entomology we have come far short. It has never been a popular subject in the North of Ireland, and beyond two papers on Beetles and Lepidoptera I do not think that any others have appeared in our Proceedings.

As an example of the need of working up and placing upon record the productions of our own district let me give an illustration. The sponges are a well defined and exceedingly interesting group. There are a few fresh water species, while most are marine. Attention has lately been drawn to the group and several new fresh water species discovered in streams in the South West turn out to be not only new to our fauna but to be American species,—another of those interesting Irish links of connection with the far West. Our Ulster streams should be carefully scanned for these. I have noticed fresh water sponges in abundance making beautiful sage green patterns on the bottom of sunlit pools in the Lagan and in streams near Saintfield but have not had opportunities to have them examined. The eggs containing the beautiful spicules require examination in winter to find out the species.

It will not be denied that a good novel by some master of the story telling art is of more general interest than some book of reference—a dictionary or book of statistics like Whittaker or the Army List. The interest of the novel lies in its connected and detailed delineation of character or in the gradual development of an interesting plot. Turning from literature to science we need more Life histories than dictionaries, more monographs of single species or individuals than monographs of groups or classes.

Good work—work which will repay the student himself and be of real use in the advance of science—may be done *in*

working out life histories of plants or animals—work which cannot be done in the open air. This is work which lies within the reach of each one. All that it requires is first, choice of a suitable subject, then, patience and good powers of observation and recording.

Many people who take up some branch of science seem to think that the one object of their study is to collect and especially to collect something which no one else has got—whereas the true object of our favourite pursuits is not to amass rare specimens but knowledge—to understand something of the varied and prolific life with which the world teems, its origin and modes of development and meaning.

I mean by the study of life histories taking one species and directing upon it all the powers of investigation which have been improved in these times to such a wonderful extent, and having turned the search-light on the plant or insect as the case may be and examined and re-examined it under every aspect of light and shade, day and night, summer and winter youth and old age, to record its habits with care and accuracy, all that has been learned about it. Its birth, youth, maturity, decay, morphology, anatomy. How it is made, lives and works ; what its place in the world.

Work of this kind requires not to be done for rare species, but for the commonest and most familiar. In this interesting work of compiling life histories and recording habits, which no doubt require time which some cannot afford but which I am certain will repay the observer well, the camera may be made to play a most useful part—witness Kearton's beautiful works, *Wild Nature with a Camera* and others.

Photography might be used I think to illustrate the seeds of plants. Mr. Clement Reid, in his work on the *Origin of the British Flora*, complains and justly that there are not collections of seeds in our museums available for comparison. I imagine a set of photographs of seeds would be valuable. A similar set of the nuts or seed vessels of the sedges would be of the greatest use.

Take up some definite object of study and try to illustrate it with completeness and care, and do not dissipate time and energy in the search for pretty things which have no connection or teaching when isolated and dragged out of their environment.

I had hoped to touch on economic botany in connection with our new National Board of Agriculture, and the fine cases now being accumulated in Dublin in illustration of this subject, and the need of having something of the same kind in Belfast. Of the need of a library of reference of works of Natural Science, and also of collections of mosses, Lichens, Fungi and Algae and other groups, which would be available for study and comparison to the members of our club. They may come I hope in time.

My object has been not to criticise methods of working, for our Club stands in some ways at a disadvantage in not possessing like other Societies of the kind a building and appliances of its own, but to suggest ways and directions in which progress might be made.

Let us keep before us the true objects for which our club was founded and remembering the traditions of the past endeavour to extend its work and usefulness in the coming century. Without boastfulness it may be truly said that it has always been a centre of progress and education in Belfast in all that relates to the love of nature and the pursuit of those humanizing and elevating studies which lead us to wonder ever more and more at the beauty which is so lavishly spread around in things great and small, at the wisdom and power and patience of which they are the expression and embodiment.

May we seek in our communion with nature to be always learning at her feet and to drink in of her spirit, her infinite patience and calmness, to soothe the impatience and restlessness of ours, her impassiveness and strength to give us firmness and power, her prodigality and kindness to give generousness to ours, her beauty so touching and widespread kindling into flame the admiration and wonder of our spirits to ennoble and refine them.

19th December.

MR. ADAM SPEERS, B.Sc.—“THE ORIGIN OF
CAVERNS IN LIMESTONE DISTRICTS.”

MR. SPEERS very fully described the various forms of caves, and demonstrated by a successful chemical experiment the solubility of limestone in water charged with carbon dioxide. The extensive deposits of limestone in Ireland and elsewhere are acted upon in this manner. Thinly bedded rocks fall down when they are thus undermined, but when the beds are very massive they remain undisturbed, while the percolating waters form great hollow spaces or caverns below, because the surface rain waters percolating through the decaying vegetable matter obtain a full charge of carbonic acid which dissolves the limestone and forms channels for underground rivers, which, in the course of ages, result in the formation of the caverns so very common in all limestone districts, caverns which contain great chambers decorated with fantastic groups of pendant stalactites and stalagmites, built up on the floors by the evaporation of lime-laden waters. As an example Mr. Speers described the great mammoth caves of Kentucky which he had visited, and which are found to consist of a series of chambers on five different levels connected by miles of avenues through which the visitor is taken by the guides. There are in this cave 223 avenues, 150 miles of which have been explored. There are 47 domes, one being 300 feet high ; 23 pits, one 175 feet deep ; eight cataracts, three rivers, two lakes, and one sea. The space worked out of the limestone by the solvent and mechanical action of water amounts to twelve million cubic yards. To accomplish this work a vast period of time was required.

Mr. Speers, taking his hearers from point to point in this wonderful subterranean region, illustrated each by limelight

views, which, with his own description and particulars from personal observation, conveyed a most realistic impression of the whole. In closing his address Mr. Speers referred to the anthropological value of caves, which in pre-historic times were the resort of early mankind, and referred in detail to some special examples,

Mr. Welch and Mr. Hogg exhibited some very excellent lantern views of caverns in many parts of central Ireland, and Mr. Gray exhibited and described views of caverns that occur in the several geological formations of the County Antrim, mainly, however such as were formed by marine denudation. Referring to some along the north coast, where the earliest settlements of ancient man occur, Mr. Gray suggested that probably a systematic exploration of certain examples would lead to the discovery of the remains of ancient man with the animals with which he was associated in very remote prehistoric times.

SCIENCE GOSSIP HALF HOUR.

For half an hour before the lecture there was an exhibition and discussion on land and fresh water shells, of which a large number were exhibited by Messrs. H. L. Orr, R. Welch, W. Swanston, W. Gray, and Mr. R. Standen, of Manchester. Mr. R. Welch read a short paper on the rare form of *Helix nemoralis*, found at Bundoran, where the normal form is made into necklaces and sold to visitors. Necklaces of this form are survivals of the prehistoric forms found in ancient Irish graves. Scalariform and reversed specimens occur at Bundoran, as well as a curious heavy variety, all being of great interest to naturalists, and furnished a topic for an animated discussion. Mr. R. Standen, of Manchester Field Club, sent for exhibition a series of English and Irish Amber shells, and Mr. Orr exhibited a very curious malformation of *Clausilla bidentata*, which had two mouths, and the members present exhibited over 100 specimens of reversed shells of *Helix nemoralis*.

16th January.

MR. WILLIAM J. FENNEL, M.R.I.A.I.—“INNIS
CLOTHRAN AND ITS TEAMPULS.”

The lecturer described the approaches to the island and the picturesque beauties of the lake and river scenery. He observed that the island is situated at the north end of the Lough Ree, about twelve miles from Athlone, and it contains no less than six churches—First, the diminutive church of Saint Diarmid, who founded it in the year 540; second, the great monastic church of Teampul More; third, the Chancel Church; fourth, the “Church of the Dead;” fifth, the church of Saint Mary; and sixth, the Teampul Clogas; and pointed out in detail all the interesting architectural features, and through the ruins, traced the progressive march of time from the sixth to the fifteenth century. The early crosses were fully described, and much interest was given to one, dating from the sixth century, owing to an additional importance which has since become attached to it, owing to its reproduction on the great boulder which now covers the traditional grave of St. Patrick at Downpatrick. Owing to the ruinous condition of the building by which this cross was found, it was considered advisable to half bury it with its face downward, as being the safest way of preserving it—a fact that speaks volumes for the care that is bestowed on ancient buildings. An important point resulting from the recent investigations on the island, by members of our Field Club, is the correction of several errors which were fallen into by O'Donovan and Petrie regarding the age of the Tower of Clogas and the subdivision of Teampul More. The Island of Inisclothran is intimately connected with the life of Queen Maeva, who was Ireland's Boadicea, and who in the fourth century governed “Connacht” for eighty years, and who strangely met her death at Inisclothran by the hand of an Ulster rival.

The paper was illustrated by limelight views of plans, sketches, measured drawings, and photographs, made by Mr. Fennell, and those who accompanied him to the island.

16th February.

R. LLOYD PRAEGER, B.A., M.R.I.A.—“BOTANIZING
IN THE CENTRE AND WEST OF IRELAND.”

The lecturer said that, owing to its position as the most westerly portion of the Continent of Europe, Ireland was of peculiar interest to the student of botanical and zoological geography. Here, on the extreme edge of the Continent, we might expect to find vestiges of the plants and animals that had gone before, pushed out to the very verge of the ocean by stronger species spreading from the great Eurasian land area. Likewise, the absence from Ireland of plants might help us to discover which species were the most recent comers into Western Europe, not having yet spread into this remotest corner. The flora of Ireland was found to contain several well-marked groups of plants of widely different origin. By far the most interesting of these groups were found along the western coasts. Here grew, oftentimes in abundance, a number of plants which elsewhere in Europe were to be found only in the Pyrenean area. With these were others belonging to the North American flora, the more characteristic of these being completely absent from the whole European Continent. How and when these plants came to Ireland is a very difficult question, but there can be little doubt that they represent the very oldest element in our flora, and migrated to this country over a former land surface when the distribution of sea and land along the western edge of Europe was very different from what it is now. The present distribution of plants in Ireland was profoundly influenced by soils, and, according as the prevailing rocks were limestone or non-calcareous, a large number of

species were often present in or absent from a district. Ireland could be divided into several botanical districts, the features of which he would next describe. Of the north-eastern district—Antrim, Down, and Derry—he need not speak, as it was well known to the members of this Club. South of this area stretched the central plain of Ireland, a great tract of low-lying limestone, extending from Dublin to Galway, and from the Cavan uplands south to the mountain wall of the Galtees. This was a land of vast bogs, of marshes, and pasturage, with low, cultivated ridges, and in certain districts extensive lakes. Lantern slides were shown illustrating the features of the central plain, and specimens were exhibited of its characteristic plants. The south east likewise formed a tolerably distinct area, characterised by the great granite chain of Leinster, and by a calcifuge or lime-avoiding flora. The southern and western coasts of Ireland formed the most interesting botanical district in Ireland, for here were gathered together those Pyrenean and American plants of which he had spoken. It was pointed out how the west coast naturally divided itself into five sub-districts, according to the prevalence of calcareous or non-calcareous rocks, and the physical and botanical characteristics were demonstrated by lantern slides and specimens.

Turning now to the subject of botanical research in Ireland, a brief sketch was given of the history of Irish botany, from the time when Caleb Threlkeld compiled the first Irish flora in 1726 down to the present day. The most recent work, the second edition of “*Cybele Hibernica*,” divided the country into twelve districts, and showed the distribution of each plant according to this scheme. A much more accurate knowledge of plant-distribution was, however, requisite for the purposes of the phytogeographer. Maps were shown illustrating how H. C. Watson had sub-divided England, Scotland, and Wales, into 112 divisions, and how, on similar lines, the lecturer had sub-divided Ireland into 40 divisions. What was wanted then to render our knowledge of Irish plant-distribution complete was full lists of the plants growing in each of these 40 divisions.

To this task the lecturer had applied himself four years ago. The flora of ten or twelve divisions had then been, or was being, thoroughly worked out. The plants of spring, summer, and autumn had to be listed in each division, and every kind of ground had to be explored—woods, bogs, mountains, lakes, marshes, sea shores, cultivated ground. In the four summers during which the lecturer had devoted his holidays to the work of exploration about 4,000 miles of country had been traversed on foot, and about 50,000 plant records had been got together. The county lists were assuming a tolerable completeness, and when in another twelve-month or more, the "Topographical Botany of Ireland" was published, it was hoped that at least 500 species would be on record from each of the 40 divisions. In conclusion, the lecturer appealed to the members of that Club to assist his work. Any definite record of any plant from any county would be of use. He also complimented the botanical members on the work they had already done.

During the discussion that followed it was suggested that the County Borough Council should be asked to restore and complete the botanical collection that formerly existed in what is now known as the Botanic Park, and also to provide an aquarium, both objects being of great value from a technical education point of view, and, with the assistance of the members of the Club, could be established and maintained at very little cost. Mr. Gray, Hon. Sec., subsequently communicated with the City Council and conveyed the above suggestion. He had a reply stating that the City Council had no funds to expend for such a purpose.

20th March.

MISS S. M. THOMPSON.—“ON THE SUPPOSED OCCURRENCE OF A PATCH OF WHITE LIAS OR RHAETIC ROCK ON THE SHORE N. OF MACEDON POINT, BELFAST LOUGH.”

In the spring storms of some five years ago, a patch of grey rock, unlike any other rock occurring on the shore, was exposed about a hundred yards to the north of Macedon Point, which had previously been completely concealed by a deep covering of sand and shingle. Its unfamiliarity attracted my attention and I subsequently showed it to Professor Cole when visiting at Macedon, and he at once pointed out its resemblance to the so-called “oolite” found at Waterloo near Larne. The patch of rock occurs close to the sea-wall of Macedon, and lies between two of the basaltic dykes which occur so abundantly on this shore; the sedimentary rock is seamed and interlaced with intrusive veins of the basalt which have hardened and altered it. I have placed some specimens of the Macedon rock upon the table as well as some from Waterloo, when the great similarity in appearance will be immediately noticed; also some specimens with basaltic veins which interestingly demonstrate the probability that these enclosing dykes have preserved the patch from denudation by the sea, which covers it completely at high tide. The length of the patch is about 60 yards.

I subsequently submitted some specimens of the rock to Mr. M'Henry of the Geological Survey of Ireland, who replied as follows:—

“I have received your specimen. Certainly it looks to me “exactly similar to the Waterloo Rhaetic rock. It is very “interesting to get representatives of the Rhaetic beds at “Macedon, and if this be so it is doubtful indeed if the new “Red Sandstone Rocks there belong to the Bunter division! “I have made a note of this on our 6 inch map and shall draw “Sir Archibald Geikie's attention to the fact when next he “comes to Ireland.”

Although the Geological Survey did map this part of the shore as belonging to the Bunter division, the Geological members of our Club have always considered that the beds extending from Lismara bathing-house southward past Macedon Point are undoubtedly the Keuper marls. Mr. Swanston informs me that a bed with fine pseudo-morphs of salt crystals formerly existed south of the Point, and even now fragments of this bed occur upon the shore, although it has been considerably denuded by the waves.

This difference of opinion as to which division of the Trias may claim the foreshore at Macedon Point may probably be explained by the changes that have taken place since the Survey maps were made. Some of my audience may remember a short paper ⁽¹⁾ on the remarkable changes in its aspect that have occurred during the last thirty years, the great expanse of sand which completely masked the underlying rocks having disappeared, leaving a wave-swept expanse of red marls south of the disturbed and tilted sandstones at Lismara. Overlying these red marls were beds of grey-green "freestone" which were daily removed by the steady carrying-away of sacks of their fragments by many men and women during a long period of years. These fragments were sold in Belfast for scouring tables and doorsteps, but when all the grey beds were removed, the industry ceased, no use being made of the red beds.

I think this carrying away of the grey beds is worthy of especial notice, as bearing on the probability that this little patch of rock (accidentally preserved by the dykes which enclose it, and equally accidentally exposed by sudden storms) is really the last remnant of this bed, and an outlier of the Rhaetic series so finely represented at Waterloo, at Colin Glen, and on the Cave Hill, which have been rendered classical by Professor Ralph Tate's papers on "The Liassic strata of the neighbourhood of Belfast" ⁽²⁾ and The Lower Lias of the N.E. of

¹ "A Bit of Foreshore" by Miss Sydney M. Thompson, Proc. Belfast Naturalists' Field Club. Ser. II., Vol. IV., Part II., 1894-95 p. 210.

² *Quarr. Journ., Geol. Soc., London.* Vol. XX. (1864) p. 103.

Ireland, (³) read before the Geological Society in 1863 and 1867 in which he declares the Waterloo section is the key to the reading of the Liassic strata in Ireland, although the greatest development occurs in Colin Glen, which is also referred to by Gen. Portlock (⁴). It is interesting to recall that Prof. Tate commenced his paper by pointing out that Gen. Portlock in 1843 first directed attention to certain beds linking the Triassic and Liassic formations. He describes these beds as *resting directly on the Keuper marls*, the upper or white Lias overlying the *Avicula Contorta* section. In the white Lias section of the Cave Hill, which is now much obliterated, he records the occurrence of *indurated marls exhibiting an oolite structure, which disappears 6 feet from the dyke, this bed contained no fossils*. Surely the patch at Macedon Point may, without any inherent improbability, be supposed to represent this white Lias ; we have in it the oolite structure, most marked in the immediate vicinity of the dyke and also much indurated. The base of the patch at Macedon is not visible, but the Keuper marls occur close by on the shore. Prof. Tate mentions that in the Waterloo beds there is no line of demarcation between the white Lias and the *Avicula Contorta* beds, several beds in the series presenting grey marls with disseminated calcareous particles, presenting an oolitic or even pisolitic structure. I have unfortunately not had an opportunity of examining whether any dykes occur in the Waterloo beds ; in the Cave Hill section, and the supposed Rhaetic patch at Macedon, this structure occurs close to the mass of the dyke.

In conclusion I may mention that the patch occurs close to the battery of stones which protects the sea-wall, commencing from the north side of the most northerly extension towards high water of the well known cross dykes, extends to a short dyke also close to the sea-wall, and extends seaward along the cross dykes. It may be also seen in indurated patches along the margin of the dykes south of the point, many hundreds of

³ Quart. Journ., Geol. Soc., London. Vol. XXIII. (1867) p. 297.

⁴ Report on the Geology of Londonderry (1843) pp. 49, 56, 107.

yards distant from the patch. These scattered remnants seem to me to suggest a bed covering the entire foreshore, of which only the indurated portions have survived. The mass of basalt called Macedon Point rests upon grey marls, which have been so much undercut by the sea, that I was unable to obtain a satisfactory specimen. The "oolitic" patch is completely covered by sand at present, but very little trouble would clear it for inspection, as was done a couple of years ago when some Geological members of the Club visited Macedon. I hope that the Geological Survey when revising the County Antrim maps may consider this little patch of rock carefully, and recognize the accuracy of the Club's judgment in relegating Macedon foreshore to the Keuper division of the Trias.

PROCEEDINGS—1900-1901.

ANNUAL MEETING 24TH APRIL, 1901.

The annual meeting of the Society was held in the Museum, College Square—Mr. F. J. Bigger, M.R.I.A., in the chair. Mr. W. Gray, M.R.I.A. (Hon. Secretary), read the Committee's annual report as follows :—

“ Your Committee beg to submit the following report of the proceedings for the Club's Thirty-Eighth Year, 1900-1901 :—

The programme arranged at the first Committee Meeting for the year has been fully carried out. The attendance at the several Field Meetings was equal to the average of former years.

The joint meeting with the members of the Dublin Field Club was very much appreciated by all the members who attended.

The following are the Field Meetings held during the summer session. Special reports of each are attached.

FIELD MEETINGS SUMMER SESSION.

Saintfield	..	..	12 May.
Carriekfergus	..	..	2 June.
Tullymore Park	..	..	23 June.
Navan	..	..	11, 12, and 13 July.
Glenavy	..	..	4 August.
Greyabbey	..	..	8 September.

The Winter Session was opened on the 7th November by a very successful conversazione, held in the Public Library, by the kind permission of the Library Committee of the City Council.

During the Winter Session six formal meetings were held and were fairly attended by members and their friends.

The half-hour Science Gossip held before the formal meetings proved an advantage to many members, as it affords facilities for informal conversation upon Natural History subjects, and objects brought for examination and discussion, an opportunity that might be more generally made use of.

The following communications were brought before the members during the session :—

1900—

27 Nov., "Irish Ecclesiastical Architecture"—F. J. Bigger, M.R.I.A., President.

19 Dec., "Where the Masters Wrote"—W. J. Fennell, M.R.I.A.I.

"Symbolic Ideas of the Ancients concerning Trees and Plants"—John Vinycomb, M.R.I.A.

1901—

22 Jan., "Report of Delegate to the Conference of Corresponding Societies at the Bradford Meeting of the British Association"—William Gray, M.R.I.A.

"Notes on the Bradford Meeting of the British Association"—W. J. Fennell, M.R.I.A.

19 Feb., "The Microscopical Minerals occurring in Sands"—H. J. Seymour, B.A.

"Some Notes on Sun Dials"—The President, F. J. Biggar, M.R.I.A.

19 March, "My Hobby about Ferns and its Results"—The Vice-President, W. H. Phillips.

16 April, "A Recent Tour of the Roman Wall"—A. Mc. J. Cleland.

The sub-committee appointed to report upon the advisability of republishing the B.N.F.C. Guide, in anticipation of the coming meeting of the British Association in Belfast, submitted their report. The final arrangements with reference to this matter are now in the hands of the Publishing Committee of the Local General Committee for the reception and entertainment of the British Association in Belfast.

Your delegate to the conference of Corresponding Societies attended at Bradford, and reported during the Winter Session as usual. He also attended as one of the deputation from Belfast to invite the Association to visit Belfast in 1902. This movement (originated by the Belfast Naturalists Field Club) has been crowned with success, the Association having accepted the invitation and will visit Belfast in the autumn of 1902.

The sub-committee appointed to report on the fauna of Lough Neagh submitted their first report, a summary of which is attached.

The Botanical Section had a busy and successful year, as will be seen by their report.

The Rev. C. H. Waddell, M.A., B.D., and Canon Lett, M.A., merit the best thanks of the Club for the very valuable services they have rendered the section in giving so many Botanical Demonstrations during the session.

The thanks of the Club are also due to the Rev. C. H. Waddell for the hospitality extended to the members who attended the Field meeting at Saintfield. The Club's thanks are also due to R. R. Fitzherbert, Esq., of Black Castle, Navan, for the courtesy shown the members of the Dublin and Belfast Clubs when they visited Navan; also to the Chemical Salt Company and their attentive manager, Mr. F. A. Walker, for their courtesy in conducting a large number of members through the salt mines at Eden, near Carrickfergus.

Messrs. Stewart, Wright, Orr and Fennell were appointed to examine and adjudicate on the collections offered in competition for the Club's prizes. Their report is attached.

WILLIAM GRAY, } Hon.
W. D. DONNAN, } Secs.

The sectional and sub-committees' reports were afterwards read in the following order :—The financial statement, Mr. W. H. Phillips ; the fauna of Lough Neagh, Mr. H. Lamont Orr ; librarian's report, Mr. G. Donaldson ; the judges' report, Mr. S. A. Stewart. The judges appointed to examine and report on the collections sent in competition for the Club's prizes recommended that prize *eight* be awarded to Mr. James Orr for a set of Cretaceous fossils, including forty species, and that prize *thirteen* be awarded to Mr. W. A. Green for his collection of land and fresh-water shells, which included sixty-eight species and many varieties. A collection sent by Mr. George Reilly received high commendation ; it contained fifty-six species and two varieties.

An animated general discussion took place on the various reports submitted, which were adopted without alteration.

The election of the officers for the new year was then proceeded with, resulting as follows :—President, F. J. Bigger, M.R.I.A. ; Vice-President and Treasurer, W. H. Phillips ; Librarian, G. Donaldson ; Secretaries, Mr. J. St. J. Phillips and Mr. R. Patterson, who were nominated by Mr. W. Gray, M.R.I.A., the out-going Hon. Secretary. The Committee were re-elected, Mr. Gray taking Mr. Phillips' place.

On the motion of Mr. Fennell, seconded by Mr. Dickson, a vote of thanks was passed to Mr. Gray for his services as hon. secretary and conductor of the Club's excursions during recent years.

The members present made several suggestions as to the new year's work, and named a number of places from which the Committee might select their programme of Field meetings for the summer session.

The election of several new members brought a very successful meeting to a close.

REPORT OF THE COMMITTEE OF THE BOTANICAL SECTION.

The Committee of the Botanical Section beg to report that

during the past year the work of the section has been carried on with steadiness and success. Following the acquisition of the new Cabinet which the General Committee were good enough to provide for us, the re-arrangement of the specimens in our herbarium was at once proceeded with, which enabled us to prepare a much needed list of desiderata. The dimensions of this list, we are glad to say, was reduced somewhat as the result of last summer's excursions, and we look forward with confidence to see it much further reduced during the season which is now opening upon us. We are pleased to report that the number of members taking an active part in the work of the section remains steady, and that not only the main department of flowering plants, but the various branches of cryptogamic botany have also received a fair amount of attention. The following was the programme for the Winter Session :—

Oct. Meeting.	Ferns,	Rev. C. H. Waddell, B.D.
Nov. „	Fungi,	do.
Dec. „	Club Mosses & Fern Allies,	do.
Jan. „	Hepaticae,	Rev. H. W. Lett, M.A.
Feb. „	Characeæ,	Rev. C. H. Waddell, B.D.
Mar. „	The Mosses,	Rev. H. W. Lett, M.A.

PRIZE VIII.—Mr. James Orr has sent us a set of Cretaceous Fossils. There are in this collection over 60 specimens, representing some 40 species. They are well displayed, and include several of the rarer forms, and also a number of good examples of the commoner species. We consider this a creditable collection, and have pleasure in recommending that prize VIII. be awarded to Mr. Orr.

PRIZE XIII.—We beg to report that we have examined the shells sent for competition.

We have awarded the Societies Prize No. 13 to Mr. W. A. Green for his set of 68 species, and many varieties of land and fresh water shells, some of considerable rarity. This collection

contains a very fine set of *Limnæa glutinosa*, also a very fine specimen (scalariforme) of *Helix nemoralis*, which was taken alive. He has collected three species introduced through the channels of trade—viz., with bananas and raisins. This work is to be highly commended, as it helps to explain the dispersal of molluscs.

The other set received for competition from Mr. George Reilly we think worthy of commendation; it contains 56 species and two varieties. Some new stations have been discovered by him for some of our rarer species—viz., *Helix arbustorum* and *Helix lamellata*.

(Signed)

W. J. FENNELL.
HUGH L. ORR.
S. A. STEWART.
JOSEPH WRIGHT.

LIBRARY REPORT.

We have received during the past year the usual number of Transactions and Proceedings from kindred scientific and other societies, and a large number of volumes of great interest from English and American Scientific Institutes—in all about 80 books and pamphlets. It is to be regretted that we have no cases to store them, so that they could be made available to the members for consultation.

GEO. DONALDSON, Librarian.

Dr.

STATEMENT OF INCOME AND EXPENDITURE

FOR THE YEAR APRIL 1, 1900, TO MARCH 31, 1901.

Cr.

To Balance from last Account...	...	...£10	9	6	By Expenses of Social Meeting	...	...£15	11	10
" Subscriptions ...	...	... 73	5	0	" Stationery, Printing, and Advertising	...	... 21	9	6
" Tickets for Social Meeting ..	...	... 10	4	6	" Donation to Irish Naturalist	...	... 2	0	0
" Entrance Fees ..	...	... 3	5	0	" Field Club Union	...	... 2	2	0
" Reports Sold ..	...	... 0	7	0	" Expenses of Lectures ..	...	... 3	3	0
" Flora Sold ...	...	... 0	8	6	" Rent of Museum	...	... 11	6	0
					" Collector's Commission	...	... 2	16	8
					" Prizes Awarded	...	... 1	10	0
					" Postages ...	...	... 17	0	3
					" Insurance ...	...	... 0	10	0
					" Incidentals ...	...	... 2	14	3
					" Gas ..	...	... 1	15	7
					" Expenses of Delegate	...	... 1	0	0
					" Loss on Excursion	...	... 0	19	3
					" Botanical Section	...	... 1	0	0
					" Case ..	...	... 2	10	0
					" Exhibition Stands	...	... 1	0	0
					" Balance ..	...	... 9	11	2
							£97	19	6

Audited and found correct.

W. H. PHILLIPS, *Treasurer.*

SUMMER SESSION.

2 June.

CARRICKFERGUS.

The Second Field Meeting of the Club was held in a salt mine near Carrickfergus. A party of 50 reached Kilroot by the 12.30 train, and walked along the shore to examine the raised-beach gravels that occur near the station. These gravels are remarkable for the numerous worked flints they contain, and which are almost identical with the very oldest forms of worked flints found in Europe, and indicate that this locality was the site of an ancient flint factory worked by primitive man. Here specimens can be collected that are similar in every respect to the typical forms displayed in museums as the earliest product of human workmanship. Such examples are often referred to in justification of the wildest theories as to the age of man, whose origin is sometimes referred to an interglacial or preglacial age because of the rude forms or the other conditions under which the worked flints are found. There cannot, however, be any doubt as to the relative age of the Kilroot gravels, for they rest upon the estuarine clays which overlie the boulder clay, or glacial deposits, and therefore demonstrate that the contained worked flints were manufactured long subsequent to the deposit of the boulder clay, at all events in this locality.

While many members of the party were carefully examining the gravels others were equally busy making additions to their botanical collections. The short time and very limited range of exploration did not promise much, but some of the plants collected are worthy of mention. The viper's bugloss was seen growing on waste ground close to the station, and the

pepper wort (*Lepidium draba*) was found near Eden. The rare moss, *Zygodon Stirtoni*, was found on the wall of the bridge north of Kilroot. This form is rare in Britain, and seems to be confined in Ireland to the North-East. Many forms of insects were captured and preserved for further identification.

Leaving the shore, the party walked on to see the Garden of Eden, and thence on to the Tennant Salt Mines. Here every suitable arrangement was made for the descent into the mine, and the whole party of ladies and gentlemen were lowered to the floor of the mine, some 335 feet from the surface. The ordinary miner's lamps were supplemented by coloured lights, and the grand face of salt, 46 feet thick, was very carefully displayed—so clearly indeed that a photograph was taken of the scene.

About ten years ago the Chemical Salt Company opened the mine at Eden. This is the property of Sir Charles Tennant, Bart., of Peebleshire, who owns large chemical works in England and Scotland. The thickness of the bed of salt rock at Eden is 96 feet. Of this about 50 feet is kept intact to form the roof of the mine, and the lower 46 feet is worked almost in one face of pure salt in a series of great spacious chambers 30 to 40 feet high. Mr. T. A. Walker conducted the party through the workings, and explained that all the rock was shipped to their works in England and Scotland.

An interesting discussion took place in the mine as to the nature and origin of the deposits and its relation to all the other geological formations of the County Antrim. From this it would appear that the Carrickfergus salt deposit is the result of the evaporation of sea water or salt lakes among the deposit of the new red sandstone which forms the slopes of the escarpment along the north of the Lagan Valley, and indeed underlie almost the entire area of the County Antrim. When we consider what a small proportion of solid salt is contained in sea water we may calculate what an enormous quantity of water must have been evaporated to produce a solid bed of salt 96 feet thick.

At the formal meeting held in the mine, under the chairmanship of the Vice-President, Mr. W. H. Phillips, some new members were elected, and the thanks of the Club passed to Mr. Walker for his attention and courtesy during the day.

After a smart walk back to Carrickfergus, the party had the very great advantage of seeing over the Castle, by the kind permission of the military authorities. This excellent example of an Irish castle bristles with historic reminiscences connected with the Anglo Normans, King John, the Bruces of Scotland, King William, and the attack of the French under Commodore Thurot in 1760.

The origin of the name Carrickfergus has been the subject of no small amount of controversy, and is more or less involved in the question as to the origin of the Lia Fail, or stone of destiny, that is supposed to be at present under the coronation chair in Westminster Abbey. When the Royal Society of Antiquarians of Ireland visited Belfast in 1892, they declared that "Carrickfergus is so called from Carrig, a rock, and King Fergus, who when coming here in 320 B.C. to visit the well, now within the Castle, for the cure of leprosy, was shipwrecked and buried at Monkstown adjoining." Mr. Samuel M'Skimin, in his "History and Antiquities of Carrickfergus," refers to the same legend, but points out its improbability. What Monkstown could have been 320 B.C.? Amid the conflict of authorities on this point, we may with confidence accept the very full and clear story as given by the Rev. George Hilt in his work on "The Macdonnells of Antrim," where at page two he gives an account of the descendants of Colla Uaish, who about the year 506 permanently laid the foundation of the Dalriadic kingdom of Scotland.

NAVAN.

11, 12, and 13 July.

It was arranged to have a three days' meeting this year on

the upper reaches of the Boyne Valley in conjunction with the members of the Dublin and Cork Field Clubs, and accordingly we met at Drogheda Station on the morning of the 10th inst., and took the train for Navan, where we made the Central Hotel our headquarters. The greater portion of the party left the train at Beauparc Station and walked on to Navan by the banks of the Boyne, a distance of about five miles—a delightful walk through river scenery of the most attractive character.

Navan is a typical Irish country town. It has an air of indigenous idleness, abounds in good nature, has long rows of thatched cottages, irregular hilly streets, with mouldering and picturesque remains of former, but long-forgotten greatness. One of the oldest remains is "The Moat"—a very excellent example of the ancient Irish earthen fortified residence—the home probably of one of our old chiefs who held sway in the then all-powerful kingdom of Meath. The Moat overlooks the town beneath it, and a wide range of country all round. It is artificially constructed on a natural esker ridge of gravel, which is itself the result of the conflict of waters that anticipated by millions of years the conflicts of arms that no doubt often took place in and around this spot.

Coming back to the hotel, a short walk in the opposite direction took us to the ruins of Athlumney Castle, that overlooks the river near the railway. The site is now an enclosed garden in charge of the good ladies of St. Joseph's Convent of Mercy, who kindly permit visitors to see the old castle, and enjoy the display of taste and culture that is manifested all round. The roofless walls and bare mullioned windows of the ruins denote the noble character of the domestic architecture of the sixteenth century, while the square keep of the adjoining ivy-clad castle calls to mind the contests of the thirteenth century between the Anglo-Norman knights and the warrior chiefs of the Irish; and the souterrain by the railway just below the castle leads still farther backward to the unrecorded periods of Irish history.

By the generous permission of R. R. Fitzherbert, we were

admitted through the beautiful grounds of Black Castle. This delightful walk afforded the opportunity of studying the main features of the Boyne, which flows with a stately dignity as if conscious of its ancient and historic associations. Our experience very fully verified the description given by W. R. Wilde in his invaluable work on "The Beauties of the Boyne," where he says—"High beetling crags, crowded by feudal halls and ruined chapels; steep, precipitous banks, covered with the noblest monarchs of the forest; dells, consecrated to the moon-light dance of spirits and elfins; and rocks, memorable for the tales of love and legends of olden time, catch the eye at every turn in this noble stream, presenting new beauties, ever-varying pictures, here in sunshine, then in shade, with charming bits of scenery which simple prose cannot describe."

Some distance down the plantation we were met by Mr. Fitzherbert, who very kindly conducted us over his "hatchery" for salmon and trout. Although the season was late and the tanks were not in full working order, Mr. Fitzherbert very fully described every detail of his very interesting work in providing millions of eggs or spawn and developing the young fish until fit to pass on to the river to make its own way in the world. No doubt this kind of original investigation and voluntary effort will be encouraged and assisted financially by the new Agriculture and Technical Instruction Board, which has an important mission to fulfill.

Coming out on the country road from Black Castle demesne, a short walk brings us to the very fine Round Tower of Donaghmore. Perhaps its most interesting feature is the figure that is sculptured over the door, and which is claimed as proof of the Christian origin of the Round Towers. The original foundation of the adjoining church is said to be of the time of St. Patrick. It is described in the "Tripartite Life of St. Patrick," but the tower is not. The remains of a thirteenth century church and the tower form a picturesque group, but visitors should remember that the upper

portion of the tower is quite modern. Returning to the hotel about 9 p.m., we adjourned to our respective quarters to prepare for next day's investigations.

On the 12th we had a long day's work before us on the hills of Sliabh na Caillighe, near Oldcastle, yet the first train from Navan was so late as 10-40. A second visit was therefore paid to Athlumney Castle, burnt by its last lord, Sir Launcelot Dowdale, whose estate was forfeited in 1700. A visit was also paid to the very fine Roman Catholic Church on the way to the station. Leaving for Oldcastle, a good view of Navan Moat was obtained from the train, and, hurrying past a number of inviting historical localities, we arrived at Oldcastle about noon. Mr. Carolan was fully prepared with suitable vehicles, on which we started at once for Loughcrew, the demesne of the Naper family, who have done so much to investigate and preserve the numerous ancient monuments on their property. Our first halt was to see the perfect example of one of the souterrains, or underground dwellings, that occurs within the enclosed garden of Loughcrew. We have never seen a better example or one in a better state of preservation. The passages are built of field stones, covered on top by rough flags. The chambers are large, and comfortably held from ten to twelve visitors at a time. As usual, the chambers were formed at the ends of the passages. The latter were in some places 6ft. high and 4ft. to 5ft. wide, and here and there were the characteristic obstructions, which obliged the visitor to advance almost on hands and knees.

Leaving the country road at the park entrance, a very steep ascent of 400 feet brought us to the crest of Slieve na Calliagh, which here is about 840 feet above sea level. The undulating crest extends westward for a distance of about two miles and a half, the central hill being Carnbane, having a height of over 900 feet. This extended area is simply covered with archaic

monuments of the most interesting description—carns, tumuli, stone circles, and richly-sculptured stones of the most primitive type, any one of which would be worth a day's journey to see, yet there are some twenty-eight ready to be inspected, so numerous and so scattered as to justify the local legend that a celebrated witch in the "ould ould times" scattered the stones out of her apron. The monuments are mainly chambered tumuli. A circle of forty to fifty large stones, from 5ft. to 12ft. in length, encloses a heap of ordinary field stones piled into a cone, and beneath the pile is a great chamber formed of large stones, 5ft. to 6ft. high, and a passage from the outside to the chamber formed of similar stones, all being covered over with incised markings of circles, chevron patterns, and numerous other devices now wholly unintelligible. These monuments have been thoroughly explored and fully described by the late E. A. Conwell in the "Transactions of the Royal Irish Academy," and also in a separate work by Mr. Conwell on "Ollamh Fodhla." The monuments are also described in Ferguson's "Rude Stone Monuments."

We have several references in the ancient annals of Ireland to justify the conclusion that Slieve na Galliagh constitutes the site of one of the Royal Pagan cemeteries of Ireland. One of the most correct of our manuscripts is known as "The Book of the Dun Cow," compiled at Clonmacnois, A.D. 1,100. This book includes a number of tracts, one of which is "The Senchas na Relic," or "History of the Cemeteries," which tells us—

"The three cemeteries of idolaters are
The cemetery of Taillten, the select,
The ever-clean cemetery of Cruachan,
And the cemetery of Brugh."

And it states further—"At Taillten the kings of Ulster were used to bury—viz., Ollamh Fodhla, with his descendants, down to Conchobhor, who wished that he should be carried to a place between Slae and the sea." According to the Four Masters, Ollamh Fodhla died B.C. 1277, and, according to the annals of Tigherneach, Conchobnor died A.D. 33, thus giving a period of thirty-one centuries during which the cemetery was used; and

numerous references in the Annals of the Four Masters show that the place was well known for several centuries after.

We now come to consider the origin and meaning of Taillten. This is explained in the "Book of Lecan," which says that the fair of Taillten, or the Ænach of Taillten, was instituted by Lug, a King of the Tuatha de Danann, in honour of Taillte, wife of the last King of the Firbolg Colony, whose death is recorded at B.C. 1829. From this we may reasonably surmise that Queen Taillte was buried in the cemetery we have been exploring. Her request to King Lug was that the fair Ænach, or assembly, should be "around her Leacht."

Both Mr. Conwell and Mr. Fergusson seem to think that it may yet be possible to identify the tombs of Queen Taillte and Ollamh Fodhla among the groups of monuments on the crest of Sliabh na Caillighe.

As the day was far advanced, we were reluctantly obliged to make for our vehicles, and drive on to Kells, where we arrived too late to catch the last train for our headquarters at Navan. However, a substantial and well served dinner, promptly provided at the Headfort Arms, prepared us for the further exploration of the crosses, round tower, and oratory of Columba at Kells, so often and so well described in our antiquarian records; and then we finished the day's work with a drive to Navan, where we arrived about midnight.

On the 13th we made an early start from Navan for Bective Abbey and Trim, driving through the rich pasture lands of Meath, the hedgerows, clothed with a luxurious growth of vegetation, regaling the senses with a delicious fragrance, bloom and freshness. About five miles from Navan a short turn from the main road brought us into full view of the picturesque abbey ruins of Bective, the remains of the only Cistercian monastery in Meath, founded in the twelfth century. Even yet it partakes somewhat of the style of a castellated

mansion which prevailed during the twelfth century, when the Kingdom of Meath was the battle ground of contending Irish chiefs, Norman knights, and the jealous Henry, King of England. Here the body of Hugh de Lacy, murdered at Durrow in 1186, was buried. Even this gave rise to a bitter controversy among the Churchmen, and the body was divided ; one part went to Dublin, and one to Bective. An appeal to the Pope, however, resulted in the transfer of all the remains of the Irish Viceroy to the care of the monks of St. Thomas, Dublin. The annals of Bective Abbey furnish us with detailed particulars of many of the most important events connected with the history of Ireland, particularly of the period when the power of the native chiefs passed into the hands of the Anglo-Norman invaders, and the group of buildings remaining furnish excellent examples of the typical architectural features of that most important period. After a further drive of about five miles we reached Trim, a country town, now the embodiment of peaceful repose, but once the centre around which was performed the most stirring events of Irish history, as its numerous ruins of churches, monasteries, castles, and fortified residences proclaim. Trim may be said to be the key to the Kingdom of Meath, and was selected as such by Hugh de Lacy when he was granted eight hundred thousand acres of Meath by Henry II., who parcelled out Ireland among his trusty followers, and these Norman knights were as jealous among themselves as the Irish chiefs, and hence there was perpetual warfare. As the Normans did in England so the Anglo-Normans did in Ireland, building castles to protect what they had taken, and endowing churches to condone the wrong. This was the policy of De Lacy in Trim, and hence its numerous buildings. Hammer says of De Lacy—"The realm of Ireland at this time was singularly well governed by Hugh De Lacy, a good man, a wise magistrate, who for the good of the land and the people established many good orders. He made bridges, and built towns, castles, and forts through Leinster, as Sir John De Courcy did in Ulster. The priest kept his church, the soldiers his garrison, and the ploughman

followed his plough." De Lacy's castle at Trim is a formidable pile on the left bank of the Boyne; it is called King John's Castle, because it is said that King John stopped in it for a time. The ecclesiastical remains in and around Trim are very numerous, and are very fully described in Wilde's "Beauties of the Boyne" and Conwell's "Rambles Round Trim," as well as in the writings of the Very Rev. Dean Butler, late Rector of Trim, whose influence in the locality contributed to the preservation of the many interesting ruins as we now find them.

Having occupied so much space with the distinctive characteristics of Meath—namely, its archæological features—we have little left for the purely natural history notes. We cannot omit to refer to the simply gorgeous display of *Rosa Arvensis* that formed the hedges, particularly from Navan to Trim; patches of full bloom were seen fully 18 feet to 20 feet, and the elder tree was in great profusion and good bloom. The water plants along the banks of the Boyne were in capital condition and great variety—*Sagittaria sagittifolia*, or the arrowhead, the beautiful iris, and the sweet rush. Dragon flies were abundant, including *Gomphus splendens*, with its vividly bright metallic colouring. Butterflies of the genus *donacea* were collected in the iris at Dunmo and Trim. The sudden appearance of *Helix virgata* near the Yellow Tower at Trim suggested a snail shower, for this species often appears in large numbers after a shower. Several species of the same genus were collected.

In order to reach Belfast in reasonable time we were obliged to leave Navan at four o'clock, and to wait at Drogheda for nearly two hours, which gave us the opportunity for visiting some of the points of interest there, and we arrived at Belfast about 9 p.m.

4th August.

GLENNAVY.

The fifth meeting of the session was held at Glenavy and the shore of Lough Neagh. A large party left Belfast, and were joined by members from Lisburn, Antrim, &c. The walk from Glenavy Railway Station to Lough Neagh—a distance of about two miles—was undertaken under the most favourable conditions, and was highly appreciated by the party, not only as an interesting country ramble, but also for the excellent opportunities it afforded for the practical study of so many of the subjects it is the special function of the naturalists to investigate. Deviating from the country road, the party entered Glenconway, and for some distance traced the banks of Glenavy River. The latter was very much swollen by the recent rains, and presented sheets of water that added very much to the beauty of the varied scenery along its winding course. Here the photographers made some records, and the entomologists some captures, while the botanists were by no means idle.

The eastern margin of Lough Neagh, with its sandy borders, possesses a varied and very interesting land flora. The aquatic and subaquatic plants of its waters and neighbouring drains add considerable interest, and constitute a region most attractive to the botanist. The River Glen yields a good many of the silvern species. Here the melic grass (*Melica uniflora*) was found in profusion and very luxuriant. The yellow locsetrife (*Lysimachia vulgaris*), one of the many pretty lacustrine plants, was met with on the lake shore; more like a garden species, it was conspicuous by reason of its brilliant heads of yellow flowers. In the lough and adjacent pools one of the rarer pondweeds was found (*Potamogeton heterophyllus*); it was very abundant, but out of flower. The unusual high water of the lake prevented the collecting of charas. The cow wheat (*Melampyrum pratense*) was found on the roadside going to the lake. An otherwise unattractive roadside wall furnished the

best plant of the day. This was *Foa compressa*, which until recently was only recorded from two stations in the North of Ireland. As it is not a conspicuous plant, it has probably been overlooked, and may possibly be found elsewhere.

The well-known fossil wood, or petrified wood, of Lough Neagh, was collected along the shore near Sandy Bay. Specimens were selected, which illustrated stages in the process of petrification, part being soft lignite and part solid stone. Solid blocks of ferruginous clay or ironstone were also found, which, when split open, were found to contain very beautiful impressions of leaves. Similar plant remains occur in the iron-ore beds of Ballypalady, on the Northern Counties Railway, Glenarm, and elsewhere in County Antrim. The deposits are of special geological interest, and, like the beds on the island of Mull, described by the Duke of Argyll, indicate to some extent the character of the climate that prevailed in the North of Ireland and Scotland when the great sheet of basaltic rocks common to both countries were being formed.

Much has been done by Dr. M'Closkey, W. Swanston, F.G.S. ; Starkie Gardner, Bailey, and others in elucidating geological phenomena connected with Lough Neagh, but much remains to be done in tracing the origin and co-relation between the petrified wood, lignite, iron-ore, and plant remains associated with the deposits along the eastern shores of Lough Neagh ; and, as in the case of the diatomaceous clays at Toome, the clays of Sandy Bay may yet be found capable of being used for manufacturing purposes.

This great sheet of fresh water, with a margin of some eighty miles, is not remarkable for scenic beauty, and yet under certain conditions, such as prevailed on the return journey, it has its attractive aspects. The expanse of water, bounded on the distant horizon by the blue hills of Tyrone and Derry, the romantic Ram's Island in the middle distance, and the fringe of plantations in the immediate foreground formed a combination of natural beauty not altogether unworthy of the artist's pencil.

WINTER SESSION.

The first ordinary Meeting of the Winter Session was held in the lecture-room of the Natural History Society's Museum, on Tuesday evening, 27th November. Mr. Rodman exhibited an excellent collection of very beautiful and rare lepidoptera. Every specimen was in good condition, and mounted in a neat and skilful manner. There was an animated discussion as to the purposes served by the great variety of form and size of the insects, their brilliant colouring, and the elaborate detail of ornamental embellishment displayed both in their larval and perfected stages. Miss Wheeler exhibited some very interesting examples of humming birds' nests. At eight o'clock a most interesting and exhaustive lecture was given by the President, F. J. Bigger, M.R.I.A. :—on "Irish Ecclesiastical Architecture." He dealt with the peculiarities of our primitive structures, beehive huts, oratories, round towers, &c., of which Ireland is so richly provided. The influence of the Norman invasion and subsequent times were also very fully explained, and the lecture was copiously illustrated by lantern slides produced by our very best photographers, including a member of the Club, who is photographer to the Queen. The meeting was closed by the election of new members and an announcement of the time and subject of the next meeting.

19th December.

W. J. FENNELL, M.R.I.A.—"WHERE THE MASTERS
WROTE."

The lecturer dealt in an interesting manner with the ruins and historic associations connected with the Donegall Abbey of St. Francis of Assisi. Attention was drawn to the beautiful situation of the Abbey, and regret expressed that the fabric

should be allowed to fall into ruins without anything being done to prevent the ultimate collapse of the structure. Owing to the nature of the site the cloister garth and some of the domestic buildings are placed on the north and west sides of the church proper. The church itself was perfectly oriented, and was lighted from the east end and south side. The east window was tall and well proportioned, and was filled in with tracery. Following the usual Franciscan rule, the church appears to have been long and narrow—over 130 feet by 22 feet 4 inches—with a long transept about the same width on the south side. No trace remains to indicate the existence of the usual graceful tower, which generally rose from the centre of those churches, dividing the nave from the chancel. The north wall of the church is broken at about 45 feet from the east end, leaving a gap of 37 feet, the width of the garth, and against this gap was the south cloister, covered with a lean to roof abutting on the church wall. At the point where the break commences in the north wall the east cloister starts at right angles to the church with a walk of 7 feet 6 inches wide. This walk was covered by a range of buildings extending northwards and eastwards lineable with the chancel gable. These must have comprised the slype, sacristy, chapter house, and scriptorium, for it is stated that the monastery contained a fine library. A staircase starting for the south-east corner of the cloister leads to the dormitories over the east range of buildings, and from the slype was the prior's door, which still remains. The wall of the cloister on the extreme north also shows evidence of a two-storey range of buildings, but it is purely conjectural what form filled up the ground on the west side of the walk. The details of the architectural work are nearly all gone, and the cloister arcading is the only piece of any importance left. There is a series of well-shaped and double chamfered pointed arches springing off semi-octagonal doubly worked piers, whose section is carried round the arch, and whose caps and bases are skilfully moulded. Larger arches seem to have spanned the junction of the cloisters of double orders, the inner one spring-

ing off well worked corbels, and the cloisters are wide and well proportioned. Such are now the dim outlines of the fast disappearing walls beside which, in 1632, Michael O'Cleary and his companion workers built their temporary huts, in which they lived till August, 1636, while they compiled the "Annals." They called their work "The Annals of the Kingdom of Ireland," but Colgan, a Donegal Franciscan Father and Professor at Louvain, renamed it the "Annals of the Four Masters," by which title the composition will be for ever known.

The monastery was founded for the Franciscans of Strict Observance in the year 1474, by Hugh Roe, "The Great O'Donnell." It flourished till 1601, a period of 127 years—short for a monastic existence—but full of life and vigour, the brethren following the footsteps of St. Francis, for good works to the poor, and all others after; and when the final storm swept over it, with fire and merciless hatred, more than one thousand victims perished miserably in its destruction. This occurred in 1601, when it was invested by the English. The brethren fled on the approach of the hostile forces, some to die in the wilds of Donegal, some by sea to distant lands, where Irish Colleges offered them asylums, and the repose which was denied at home. The monastery was plundered of all it held sacred, and converted into a garrison, only to be destroyed by an explosion of the powder stored by the troops. The Masters record that the powder ignited "so that it burned the boarded chambers and the stone and wooden buildings of the entire monastery."

Michael O'Cleary, the Irish "Ollamh," was one of a family of historians and poets to the great princes of O'Donnell. After the famous flight of the chiefs of O'Donnell, he found his way to the Irish College of Louvain, in Belgium. This college was presided over by an Irishman, Father Hugh Ward. Ward obtained permission to employ him to collect materials in Ireland for him, and this brought O'Cleary back again as a Franciscan to his native land. While on this mission for Ward he conceived the idea of collecting and compiling the

"Annals," "for the glory of God and the honour of Erinn." In this labour he was assisted by Fergus O'Mulchonry, Peregrine O'Duigenan, and Peregrine O'Clery ; and Conary O'Clery as secretary. Michael O'Clery, an old man, when his work at Donegal was done, wandered sadly back to the peaceful college of Louvain to die, and there in 1643 he was laid to rest. Louvain, also, had its troublous times, and O'Clery's grave became lost in the upheaval and confusion.

The lecture was excellently illustrated by limelight views of the ruins and the scenery around.

MR. JOHN VINYCOMB, M.R.I.A.—"SYMBOLIC IDEAS OF THE ANCIENTS CONCERNING TREES AND PLANTS."

By common consent of mankind TREES have in all ages been selected as affording most appropriate emblems of the sentiments by which *States* as well as individuals have been swayed, as well as to indicate the various changes in condition to which from time to time they have been subjected. It is only needful to mention the *palm*, the *olive*, the *bay*, the *cypress*, and we recall at once the ideas of *rejoicing*, *peace*, *victory*, and *mourning*.

"THE WILLOW OF THE BROOK" to dwellers in an arid and thirsty land must have been associated with pleasureable feelings, and to the Israelites settled in a land which was the "joy of all lands" this tree continued to be emblematical (Is. xlv. 4.) of joyful prosperity. During the captivity in a strange land, to that nation at least the *willow* assumed a directly opposite feeling—and that of deepest of sorrows. "By the waters of Babylon, there we sat down, yea we wept when we remembered Zion. We hanged our harps upon the willows in the midst thereof. For there they that carried us away captive required of us a song ; and they that wasted us required of us mirth." The Willow *never again* appears to have been associated with feelings of gladness, even among the heathen nations ; for what

reason we know not, it was a tree of evil omen, and was employed to make the torches carried at funerals. Our poets have made the Willow the symbol of despairing woe : *Spencer* makes it the part of the forlorn ; *Shakspeare* represents the doomed Queen of Carthage standing

“ with a willow in her hand
upon the wild sea banks ; ”

and *Herrick* says

“ As beasts unto the altars go
with garlands dressed, so I
will, with my willow wreath also,
come forth and sweetly die.”

THE CYPRESS is a tree also associated with sad and sombre feelings, and was dedicated by the Romans to *Pluto*, because when once cut into it never grows again. Its dark solemn appearance certainly renders it an appropriate memorial in the churchyard. Cole, an old writer, says :—“ Cypresse garlands are of great account at funerals amongst the gentler sort, but Rosemary and Bayes are used by the commons both at funerals and weddings. They are plants which fade not a good while after they are gathered . . . and intimate that the remembrance of the present solemnity might not die presently.”

The custom of putting up Holly, &c., in houses and churches is one of great antiquity, a writer in the *Gentleman's Magazine* in 1767, says :—It seems very probable that the origin or first hint of the ancient custom of dressing our churches and houses at Christmas with greens was owing to, or taken from certain expressions in the following prophecies of the coming of our Saviour.

“ Behold the day shall come, saith the Lord, and I will raise unto David a righteous branch.” (Jeremiah 23, 5.)

“ For behold I will bring forth my servant the branch.” (Zech. 3, 8.)

Thus speaketh the Lord of Hosts, saying, Behold the man whose name is the Branch, and he shall grow out of his place.” (Zech. vi. 12.)

“At that time will I cause the branch of righteousness to grow up unto David.” (Jermh. xxxiii. 15.)

“It must be allowed” the writer continues “that these passages and expressions in which our Saviour is represented under the type of a *branch*, a *righteous branch*, a *bough*, the branch of righteousness who will reign for ever, &c., in the above mentioned clear and eminent prophecies of His first appearance in the flesh upon earth, are in a most lively manner, brought to the memories and strongly alluded to by those branches and boughs of evergreens, &c., with which our churches and houses are adorned in commemoration of that Holy Festival.”

Of the trees and plants mentioned in Scriptures I need not enlarge, but will merely glance at some of those of classical and mediæval times.

Of all the trees of the ancients none appear to have so much written about them as the *Laurel* or Bay tree, the *Oak*, the *Olive*, and the *Palm*, and many delightful stories are told concerning them, certainly they have served poets and historians with a wealth of imagery and symbolism of every kind down to the present day, and not only that, but the ideas associated in ancient times with particular trees rendered them sacred and their influence over the lives and actions of men, even of whole nations, is something remarkable. For instance take the *Laurel* or Bay tree. Sacred to Apollo. Daphne, daughter of a River Deity flying from the pursuit of the amorous sun god, escaped by being changed into a Laurel tree, whereupon Apollo declared that

because thou canst not be
My mistress, I espouse thee for my tree ;
Be thou the prize of honour and renown,
The deathless poet and the poem crown ;
Thou shalt the Roman Festivals adorn,
And, after poets, be by victors worn.

Tasso thus eulogises the Laurel, as the victor's crown.

“O glad triumphant bough

That now adornest conquering chiefs, and now,
 Clippest the brows of overruling kings,
 From victory to victory ;
 Thus climbing on through all the heights of story,
 From worth to worth, and glory unto glory."

The Greeks gave a wreath of Laurel to the victor in the *Pythian* games, but the victor in the *Olympic* games had a *wreath of wild Olives*. In the Nemean games the victor received a wreath of wild parsley, and the victor in the Isthmian games a wreath of dry parsley or green pine leaves. St. Paul refers to these honorary crowns of victory in the games of the Greeks, as striving after a *corruptable crown*, in contradistinction to the "*incorruptable crown*" of the gospel he preached.

THE TRIUMPHAL CROWN (*coronæ triumphales*) originally formed of laurel or bay leaves, was given to the general who obtained a triumph. Of all the honours decreed to Cæsar by the Senate he is said to have valued most the privilege of wearing a laurel crown ; we see it frequently represented adorning the head on antique busts, coins &c., modern art repeats the same distinction on the heads of kings and heroes. A head so decorated is said to be laureated. Aesculapius wears a laurel crown, because that tree is powerful in curing many diseases. St. Gudale in christian art carries a laurel crown.

"The triumphal crown" among the Romans designated the distinguished merit and bravery. Thus it was the custom of the allies of the Roman Republic, who ascribed their safety or deliverance to the success of the Roman arms, and even the cities of Italy who admired their victorious general, to adorn the splendour of his triumph by their voluntary gifts of crowns of gold, which, after the ceremony, were consecrated in the temple of Jupiter, to remain a lasting memorial of his glory to future ages. Thus the triumph of Cæsar was enriched with 2,822 votive crowns, whose weight amounted to 20,414 lbs. of gold, this treasure was however melted down by the prudent Dictator, as more serviceable to the soldiers than to the gods,

an example imitated by his successors. This custom was derived from the Greeks. The oration of Demosthenes is well known, the subject of which is "The Golden Crown" decreed him by his fellow citizens, and opposed by Aeschines.

"*The Laurel, mead of mighty conquerors*" (as Spencer terms it) when admiration assumes the form of numerous *crowns of gold*, it might be no indifferent reward for a victorious general in ancient times. Things are however done differently in modern days. The State assumes the responsibility of rewarding the victor, the Sovereign as the fountain of honour creates him a peer of the realm with suitable income and many titles and honorary distinctions, while the gratitude of the people is shown by many of the chief cities who are proud to confer upon him the "Honorary Freedom" of their towns enshrined in golden caskets. The general is usually no less laudatory of the bravery of his troops who figuratively share with him the glory of the victory—but for *final tangible reward*—if I may use the words of Lover's poem "The Soldier":—

"For what had he to do with laurels?

He was only one of the rank and file."

But to return to ancient story, *Laurentum* the capital of the ancient kingdom of *Latium* was so called by the circumstance related by Virgil. On the foundation of his city by King Latinus on the sea coast east of Tiber—a venerable Laurel tree was found growing on the spot he had selected.

This plant Latinus, when his town he walled,
then found, and from the tree *Laurentum* called,
and last,—in honour of his new abode
He vowed the laurel to the laurel's god.

Aeneid, Bk. VII.

"Secure from thunder and unharmed of Jove."

The ancients believed that Laurel communicated the spirit of prophecy and poetry: hence the custom of crowning the pythoness and poets, and of putting laurel leaves under one's pillow to acquire inspiration.

Poets Laureate are so called from an ancient custom in the English universities of presenting a laurel wreath to graduates in rhetoric and poetry. Aspirants were wreathed with laurels in berry. Authors are still so crowned in France. "Laureation" is the transferring of degrees in Scotch Universities. The title "*Laureate*" was conferred by Edward III., on an officer of the Royal Household whose business it was to compose a *birthday ode* for the monarch, and another for the new year. The post is now a sinecure.

All the legends and romance of old time with its wealth of ideas that still cling round the *laurel* are with us to-day as strongly as ever. It is still the symbol of victory and peace, or of that peace obtained by victory. It is a frequent charge in heraldry symbolizing the military achievements of the 1st bearer. Many names such as Laurier, Laurie, Lowry, are derived from the tree and usually figure in some form in the family escutcheon. Our poetry and literature teem with allusions to the laurel. Shakspeare makes frequent reference always in a splendid manner to the *victor's* wreath—of which I quote a few at random.

"Now are cur brows bound with victorious wreaths,
Our bruised arms hung up for monuments ;
Our stern alarms changed to merry meetings,
Our dreadful marches to delightful measures."

Richard III, I, I.

"With bruised arms and wreaths of victory."

22 January.

WM. GRAY, M.R.I.A.—"REPORT OF DELEGATE TO THE CONFERENCE OF CORRESPONDING SOCIETIES AT THE BRADFORD MEETING OF THE BRITISH ASSOCIATION," AND

W. J. FENNELL, M.R.I.A.I.—"NOTES ON THE BRADFORD MEETING."

Mr. Gray said, meeting here as citizens and members of a scientific society, it becomes us, before proceeding with the

formal business of the evening, to refer briefly to an important event reported since we entered this room, an event which has closed the Victorian Era, and excited feelings of profound sympathy and sorrow through the united Empire, if not through the entire civilised world. I refer to the death of our Most Gracious Sovereign Queen Victoria, whose reign will be forever distinguished for the advancement made in science and its application to the practical purposes of mankind, issues due in no small degree to the impulse imparted by the efforts of the late Prince Albert. A reign no less remarkable for the cultivation of domestic and moral virtues, which, in the person of the Sovereign, shed a brilliant lustre around the throne of Queen Victoria, whose death we each and all most sincerely deplore.

Mr. Gray's report as delegate gave a detailed description of the origin, development, and the present modes of procedure of the British Association, which held its first meeting in York in 1831, so that its history to the present is coincident with the late Queen's reign. In 1884 the British Association arranged for holding an annual conference of delegates from such local scientific societies as conducted original investigations and published results of a satisfactory standard, and when accepted as a corresponding society of the association, has the right to send a delegate to the conference, who becomes for the time *ex officio* member of the governing body of the association, and has a voice in its deliberations. The conference of delegates is specially intended for the discussion of matters relating to the local societies, their plans of operation, and modes of publishing results. The question of copyright, and how best to co-operate with the association, and to help in carrying out its investigations were very fully discussed in Bradford. Mr. Gray then gave a detailed account of the different subjects of original inquiry engaging the attention of the several sections of the association, and referred particularly to such subjects as the Belfast Field Club may be enabled to consider and co-operate with the committee in charge, such, for example, as

inquiries regarding legends, superstitions, proverbs, folk-lore, racial characteristics, archæology, ancient monuments, Palæolithic remains, coast erosion, erratic blocks, geological phenomena, migration of birds, the life history of plants and animals, marine and fresh-water fish. Photography is becoming more and more applicable for the purposes of scientific investigation, and local societies may render very valuable aid by its systematic use. A committee has been appointed by the association for some years past for collecting and arranging photographs of geological phenomena. On this committee there are only two Irish members, and both are members of the Belfast Naturalists' Field Club. According to the last report, the numbers of geological photographs contributed by Great Britain and Ireland are as follows:—England, 1,499; Scotland, 310; Wales, 173; Ireland, 507. The three largest county contributors are:—Yorkshire, 446; Antrim, 226; Devonshire, 126. Ireland contributes more than Scotland and Wales together, and County Antrim is the second largest contributing county in the kingdom. The contributions from Ireland were mainly through the B.N.F.C., assisted by the Limerick Field Club. Several attempts have been made both in Great Britain and Ireland to procure archæological or anthropological surveys of each country, but the success that has hitherto attended such efforts has not been anything like what might be reasonably expected, considering the many facilities that now exist for obtaining contributions towards the formation of such surveys and the great army of photographers that are now in the field. The slow and limited progress made is entirely due to the want of some central, systematic, and persistent organisation to guide, collect, and arrange results. Systematic work without persistence becomes as useless as persistent work without system, and of both we have too many examples, and local societies and individual workers will carry on this undisciplined work, unless they are instructed and controlled by such central authorities as the Royal Society of Antiquaries, the Anthropological Institute of Great Britain, or the Royal Society of Antiquaries

of Ireland. The resources at the command of our Field Club would enable us to render valuable services in the promotion of original investigations apart from our ordinary work, provided that the individual or society requiring such services would furnish clear and specific instructions as to the character of their requirements and the form in which they should be presented. In reference to the known requirements of the British Association, it is to be hoped the members of the Belfast Naturalists' Field Club may be enabled to collect materials sufficient to make a very creditable display during the coming Belfast meeting of the Association, and thus maintain the reputation they established by what they accomplished during the meeting of 1874, when they published a local guide, and formed an excellent exhibition of Irish antiquities.

Mr. Fennell submitted some notes on the work done by the British Association, and placed on the screen some views of Bradford, and called attention to the Technical School—its cost and equipment—as forming a favourable model for the Belfast Institution in many ways.⁷ He proceeded to describe the arrangements made for the excursions, and then conducted the club (in imagination) to Bolton Abbey, the Strid, and “the good old city of York.” The history of Bolton Abbey was touched on, and the chief points of interest were brought out, and a large number of pictures of the half ruined church were shown, all from photographs taken by himself and Mr. W. Grav. The chief interest, however, centred in the visit to York, which was described as “full of old things—quaint, real old-time things, old houses still preserved for their oldness—old but not aged or decrepit ; old gates, old churches, old shops, and even old furniture—a real mediæval spot preserved in the midst of this busy work-a-day world, so that one could wish for time to search out every nook and cranny in it.” The visit to St. Mary's Abbey was described, and also the Hospitium of St. Leonards, the museums, city walls, the Old Guild Hall, the civic treasures, and, lastly, the great glory of York—the stately Minster, with its visible records of every period of English art,

from the rude herring-bone masonry of the Saxon period to the lavish richness of the Tudor times. Special attention was directed to the remarkable windows of this church, which to see, even on a screen, is to admire. It is said "no architectural feature claims more general attention than the window, be it the humble casement of the cabin, the cosy dormer of the cottage, with its flood of cheery sunshine; up to the giants of the Minster, in their majesty and all their treasures of artistic glass—these are the things which, from the interior, catch the eye, and, if the proportion is defective, we weary at once of all minor details, and forget them, but one never forgets those of York.

Mr. Fennell gave a well-illustrated description of the windows known as "The Heart of British Oak," the "Five Sisters of York," and the "Great Wall of Glass."

The election of some new members brought the lecture to a close.

19 February.

H. J. SEYMOUR, F.G.S.—"THE MICROSCOPICAL MINERALS OCCURRING IN SANDS."

The paper was confined chiefly to the examination of sands for mineral constituents, which still possess their original crystalline outlines, and hence may be recognisable to a beginner with little or no knowledge of the science of mineralogy. The classes recommended for study were sea sands, river gravels, and decomposed rock material occurring in rock masses. By means of lantern slides the best types of localities for collecting were indicated. On the sea shore it was pointed out that the most suitable material for research was the "black sands" which occur in patches on shores of the velvet sand type, and which, consisting chiefly of magnetite, often contained other heavy minerals, many of them of considerable interest. Mr. Seymour described the best method of collecting the material for examination, and the various precautions to be observed so as to

ensure that the sample is as concentrated as possible. He also described the apparatus needed, and the treatment of the samples with a view to the isolation and determination of the various crystals composing it. A list of some of the rare minerals which had been isolated by the writer of the paper was given, and photo-micrographs of the actual specimens were thrown on the screen. Some of the crystals were almost ideally perfect, and much more so than is usually the case with larger specimens visible to the naked eye. Amongst other rare minerals found by Mr. Seymour in the sea sands of County Wicklow was gold. Some of the sands were so rich in this metal that at least one speck could be isolated from every handful. Though he stated that it did not now occur in paying quantities, he saw no reason to doubt that it was capable of profitable extraction by our early predecessors. Mr. Seymour pointed out the bearing its proved wide distribution in Irish sands would have on the vexed question as to the origin of the gold from which our famous ancient gold ornaments were made, and urged the members of the B.N.F.C. to take up the study of sands on the lines indicated, which might lead to some interesting and unexpected results. Samples of the sands before and after treatment were exhibited, the apparatus necessary for research, and mounted specimens of the minerals obtained in the form of perfect crystals.

The President exhibited and described in a most interesting manner some old sun dials, and suggested that all that is known of the existing old sun-dials in the North of Ireland should be collected and recorded. With this view he invited descriptive particulars from the members and friends of the club who may have, or can procure, information about sun-dials of any form still existing throughout the country.

After a discussion on the two papers submitted, the election of new members closed the meeting.

25 *March.*

CANON W. H. LETT, M.A.—“THE OCCURRENCE OF
NATTERER'S BAT AND THE WHISKERED BAT
IN CO. DOWN.”

After stating all that was known of Irish Bats in Thompson's time, the writer noticed the more recent discoveries and studies of Messrs. Harting, Kinahan, Jameson, Moffat and Dr. Alcock. His own experience of Bats began half a century ago, but it was only recently that he became acquainted with any species other than the long-eared and common Bats. Having given interesting particulars of the large numbers of common Bats to be found near Lough Neagh—where this species became quite a nuisance—the writer continued :—“In the last week of June, 1897, I captured, in Aghaderg Glebe House, Co. Down, a reddish-grey coloured Bat, which turned out to be of the species known as Natterer's Bat. It was flying about a bedroom in the dusk, where, unlike the common or long-eared Bat, it made a considerable noise in flying against objects and knocked down some small articles in the room. When I had it in my hand I noticed its light colour, and that its squeaking was louder than that emitted by the other bats I had met with. The specimen was sent to the Manchester Museum, where Mr. J. Ray Hardy kindly identified it. This little animal is scarce, and has hitherto in Ireland been found in Donegal, Fermanagh, Louth, Longford, Galway, Wicklow and Cork.

“Just 12 months ago—in March, 1899—my man found a bat one morning clinging to the outside wall of my greenhouse. This bat is about the size of the Common Bat. I noticed its face as clothed with more fur than in other bats, and from this and the peculiar form of the free diamond-shaped lobe of its ears I identified it as a Whiskered Bat. I sent the specimen the same day to Dr. Alcock, who at once wrote confirming my discovery, and congratulating me on

"the interesting find, which, as in the case of Natterer's Bat, had not previously been recorded from Co. Down."

During the discussion that followed, Mr. Robert Patterson exhibited a specimen of the Whiskered Bat which he had received from Dromore, Co. Down, in July, 1898—several months before the capture of Canon Letts' specimen.

JOSEPH WRIGHT, F.G.S.—"FORAMINIFERA OF THE PLEISTOCENE CLAY OF BOVEVAGH, CO. DERRY."

The earliest notice which we have of the fossiliferous clay at Bovevagh is in Portlock's Geological Report of Londonderry, &c.¹ At page 159 he thus refers to the clay :—"In Bovevagh the most remarkable bed is on the Bovevagh River as it passes the old church; it is full of *Turritella terebra* lying in all directions and contains only fragments of any other shell; it is separated by a layer of gravel from a sandy calcareous clay not containing fossils, and that again is covered by a confused deposit of sand and gravel 60 feet thick, streaked with more regular layers of sand and gravel." And again, "The heaped up and confused arrangement of *Turritellæ* shows a peculiar accumulation in that spot, the result probably of meeting currents, and in looking at the country, and mentally abstracting from it the superficial gravel, one is almost inclined to think that the course and manner of such formations can yet be traced."

About 22 years ago I visited this place in company with two fellow-members of the Belfast Naturalist's Field Club, and brought away some of the clay for microscopical examination. Foraminifera were found to occur in it in great profusion, and a list of the species is given in the Proceedings of the Club, 1879-80².

1. Report on the Geology of Londonderry, Tyrone, and Fermanagh, 1843.

2. Wright, Post Tertiary Foraminifera of the North-east of Ireland, Proc. Belfast Naturalist's Field Club.—app. 1879-80.

A few years ago I received from my friend Mr. William Gray, M.R.I.A., a packet of this clay which he kindly collected for me on an occasion when he had visited the place, and from this sample I obtained a good many species which had not been recorded in my previous communication to the Club. The clay weighed 4 lb. 6 oz. troy. after washing it to get rid of the fine impalpable mud I had 17.2 oz. of sand in the fine sieve, and 6.2 oz. of stones and broken *Turritellæ* in the coarse one, the stones were nearly all more or less rounded and had no marks of strike on them. The floatings that were taken from the fine material weighed .03 oz., and in this there were estimated to be upwards of 43,000 specimens. Specimens of the very rare and lovely *Bolivina Beyrichi* were not unfrequent, they were large in size compared with the other *Bolivinae*, their tests were thin and fragile, and only a few of the specimens were got perfect. This species has not hitherto been met with in British Pleistocene clay, neither has it been found recent off our coast. Among the rarer forms found the following may be mentioned—*Textularia globulosa*, *Bolivina elegans*, *Discorbina pustulosa*, and *Pulvinulina Karsteni*.

FORAMINIFERA.

- Bolocedina depressa*, D'Orb., one small specimen.
Milodina seminulum (Linn.), very common, small weak specimens.
M. subrotunda (Montag.), rare.
Ophthalmodon carinatum, B. & W., one small broken specimen.
Textularia gramin, D'Orb., rare.
T. globulosa, Ehr., rare.
Bulimina pupoides, D'Orb., very common.
B. elegans, D'Orb., common.
B. fusiformis, Will., common.
B. marginata, D'Orb., frequent.
B. elegantissima, D'Orb., common.
Urgulina Schuchersiana, Cz., rare.
Bolivina punctata, D'Orb., very common.
B. plicata, D'Orb., very common.
L. berrigata (Will.), very rare.
B. Beyrichi, Rss., frequent.
B. diluvata, Rss., frequent.
Cassidulina berrigata, D'Orb., frequent.
C. crassa, D'Orb., very common.

¹. The sieves used for washing the clay were a galvanized wire sieve 16 meshes to the inch and a miller's silk sieve 150 meshes to the inch.

- Lagena globosa* (Montag.), rare.
L. lævis (Montag.), very rare,
L. lævis, var. *clavata*, D'Orb., very rare.
L. lineata (Will.), rare.
L. sulcata (W. & J.), rare.
L. Williamsoni (Alcock), rare,
L. striata (D'Orb.), very rare.
L. squamosa (Montag.), very rare.
L. hexagona (Will.), rare.
L. lævigata (Rss.), rare.
L. lucida (Will.), very common.
Nodosaria communis, D'Orb.? one broken specimen.
N. scalaris (Batsch), rare.
Cristellaria crepidula (F. & M.), very rare.
C. rotulata (Lamk.), rare.
Polymorphina lactea (W. & J.), very rare.
Urigerina angularis, Will., common.
Globigerina bulloides, D'Orb., very common.
G. cretacea, D'Orb., very rare.
Orbulina universa, D'Orb., rare.
Patellina corrugata, Will., rare.
Discorbina globularis (D'Orb.), frequent.
D. nitida (Will.), rare.
D. pustulosa, B. & W., very rare.
D. sp. near *D. Bertheloti* (D'Orb.), very rare.
D. sp., frequent.
Truncatulina lobatula (W. & J.), frequent.
Pulvinulina Karsteni (Rss.), very common.
P. Patagonica, D'Orb., rare.
Rotalia Beccarii (Linn.), very rare.
Nonionina depressula (W. & J.), very common.
N. scapha (F. & M.), very rare.
N. pauperata (B. & W.), very rare.
N. turgida, Will. ? one broken specimen.
N. stelligera, D'Orb. very rare; specimens very poor.
Polystomella crispa (Linn.), very rare.
P. macella (F. & M.), very rare.
P. striato-punctata (F. & M.), very common.

W. H. PHILLIPS, VICE-PRESIDENT—"MY HOBBY ABOUT FERNS AND ITS RESULTS:" PERSONAL RE- MINISCENCES.

A Paper read at the Belfast Naturalists' Field Club, March 19,
1901.

A hobby, as defined in the dictionary, is any favourite object,
that which a person pursues with zeal or delight. A man's

hobbies are his spiritual vertebræ. They compose his backbone, and the marrow of his character. A man with a hobby or two, sleek and well kept, is well to do in his mind ; and to this extent, although it may in no other respect, is mentally respectable. A man's hobby is the point upon which he is strong, and we respect strength.

Dr. Andrew Wilson, in his "Body and Brain," says on the value of a hobby :—"Many men engaged closely in business suffer from brain-fag, because they do not take care to ensure that the brain-work is sufficiently varied. In plain language this is what we mean when we speak of a man possessing a "hobby." I should be careful to explain here that I do not mean a "fad." The man with a fad has generally the idea that his mission in life is to reform every person with whom he comes in contact, according to his own narrow and preconceived views. He is a social nuisance, responsible for a good deal of brain worry on the part of his victims. But the man with a hobby injures no one ; he takes delight in his flowers, his fossils, his animals, his aquarium, his coins, his insects, or any other little by-study in which he has found interest and relief by contrast of occupation from the ordinary routine of his daily life."

"A man's hobby provides him with a change of occupation, turns the working of his brain-cells into another channel, liberates his nervous energy in fresh directions, and by probably instituting new connections between the groups of brain-cells, makes the brain a more efficient instrument for the governance and control of the body. Therefore it is that I strongly advocate the cultivation of a hobby by every person. Lord Salisbury, we are told, is in private life a very efficient chemist, and I know men who, in what may be called the leisure time of their lives, have made themselves efficient bookbinders, turners, and amateur engravers. Herein lies, I think, a tremendous safety-valve for the modern brain-cell. It is an efficient instrument enough for the discharge of the work it is intended to do, but it has its own little woes and

worries, and must accept the inevitable chances of excessive wear and tear which await other organs of the frame. At the very least we may say, of change of occupation, that the important condition of absolute pleasantness and delight enjoyed by the subject thereof is a very desirable tonic to the physical units which work out our intellectual life. I can conceive nothing more appalling to be contemplated than the spectacle of a man engaged day by day in this manner, whose sole literature is represented by his daily paper, and whose life otherwise is divided into a threefold cycle of sleeping, eating and working. Such a man, I would say, if my observations of life be correct, is more liable to nervous breakdown than even the hard-worked, overwrought slave of modern commerce, literature, art or science."

Among the many pursuits that people follow now-a-days, for instruction, as well as mere amusement, few have arisen in so short a space of time, or deserve more attention than the study of that mysterious class of plants known as ferns, which are as most people are aware, a flowerless tribe, bearing, with one or two exceptions, their fructification at the back of their fronds or leaves in brown masses, sometimes round, sometimes oblong. Unlike general botany, which gives comparatively little pleasure after the flower is named, from the difficulty of preserving the colour of the specimens, the study of ferns not only leads the collector into the most picturesque scenery and wildest haunts of nature, but by the winter fireside, or in the close rooms of our crowded cities, he has but to open his "Fern-book," and the forms of his favourites appear before him, as green and graceful as when they hung by the mountain torrent or waved in some quiet shady lane, bring back to remembrance pleasant summer rambles amid lovely scenes, making the heart swell with gladness at the recollection of the forms of beauty and purity on which he has been permitted to gaze.

"As odours, pressed in Summer's hours,
From Summer's bloom remain
To soothe and comfort, till the flowers
Of Spring revive again;"

“ So memory’s magic wand restores
Gladness too bright to last ;
And in a flood of music pours
Sweet echoes of the past.”

As almost all the members of our Club are practical hobby-riders, or they would hardly belong to it, I feel I may count upon some sort of fellow feeling if I may relate how I came to be a fern hobbyist, so to speak, and that my experiences may be of use to others.

Every hobby must have a beginning, and I think in my case the initial movement began when in the early forties I learned botany from Pinnock’s Catechism, when at the school of Mr. A. F. Foster, who, on half-holidays, used to invite the day boys to join him in a country walk, when a very good number took advantage of the offer. To this day I remember the knowledge of old roads then acquired, and the pleasant conversations we had with the master on things of interest, either botanical or geological. After leaving school and going to business I had not the same opportunities, and the future hobby lay dormant. When in 1849 I went to London I had the good fortune to be for some years in one of the largest wholesale booksellers in the city. I took full advantage of this in acquiring a good knowledge of the churches and other antiquarian buildings in London, and had many adventures to Kew Gardens and the parks.

My duties took me daily through the East End and City of London, my district extending from the east end of Paternoster Row to everywhere east, and north to Islington, and through all the south of London.

On one occasion I remember seeing a large glass case taking up the side of a room, or hall, filled with ferns. I admired them greatly, but had completely forgotten where this was. In various after visits to London I went over my old district, but could not find the place ; but forty years after, when preparing a paper for the British Pteridological Society, it came to me like a flash that it was in Bishopgate Square, in the

house of Edward Newman, the author of a large book on ferns where I used to go frequently on business.

Newman's *British Ferns* was then considered an authority, but is now of little value, his work being entirely taken up with the division of ferns into species, scarcely any of which are now in use with fern growers.

The hobby still lay dormant, but leaving London, and returning to Belfast, I went with my family each year to the Spa, Ballynahinch, in County Down. This is a valley encircled by hills and foliage, with a demesne in the centre. I there saw ferns in plenty, of normal forms. I was delighted, and brought back growing specimens of all I could find. I knew nothing about them, but at once got Moore's *Handbook of British Ferns*, then the best book on the subject, and which still remains the best for normal forms.

I often thought of the wall case of ferns in London, and I determined to have one ; so I got three glass doors, and made a case against the yard wall, three feet wide, with shelves on the back for fern pots. I did my own hunting for ferns in other localities ; brought in the leaf mould and sand, did my own potting, and succeeded well. The place, however, was small.

My hobby was then fairly launched. This was about 1855-6.

Shortly after I heard that Mr. Thomas Malcomson was growing ferns, so I called on him and introduced myself as also a grower of ferns. He asked me to his house at Fairview on the Crumlin Road to see his collection, and I showed him mine. Having a kindred hobbyist to talk to is always a great help. A friendship was thus formed which was very pleasant, which was cemented by constant fern excursions on all available opportunities, and continued until, in 1859, Mr. Malcomson went to Australia, where he has since resided. His collection of ferns is still extant, in the possession of his brother, Mr. Greer Malcomson, one of the members of this Club. Unfortunately, for many years past he has not hunted much, if at all. On all occasions when possible to get from business we had

excursions for fern hunting, the most prolific of results being to Colin Glen, Castle Dobbs, Old Mill Glen, Gleno, &c.

For many years I continued to take my family to the Spa, Ballynahinch, in the summer months; and on an excursion from there to Seaforde, I found my first *A.F.F. Cristatum*. We were driving on one of the country cars or shandrydans; I looking keenly at the hedges as we passed along. I was rewarded by seeing a crested tip of a frond, peeping through the hedge, I jumped off, and succeeded in finding the plant and digging it out. It has proved a most beautiful crest, of a form not since found. That fern is still represented in my collection for at least 40 years. Thus "a thing of beauty is a joy for ever." Divisions of this fern have made their way into most of the best collections in England and Scotland, and is found in the catalogues of the trade. By this time the fern hobby had a good hold. During all this time I endeavoured to induce others to join in the pursuit but with little success. About 1857 I read with pleasure a book on "The Growth of Plants in Closely Glazed Cases," by Mr. N. B. Ward, of the Apothecaries Hall, London, principally applied to the growth of ferns in towns, where smoke and dirt render their growth impossible. This book I lent to others. The late Mr. Robert Patterson was acquainted with Mr. Ward, and had a case on his plan made for the growth of ferns. His son, Mr. W. H. Patterson, informs me this case is still in existence and in his possession.

About 1858 a meeting of a few fern lovers was held at Mr. Patterson's house, College Square North, to talk about ferns and the possibility of forming a society to encourage their growth. At this distance of time I forget all who were there, I know Mr. W. H. Patterson, Penrose Beale, Thomas Malcomson, and myself, and Mr. Robert Patterson. A resolution was passed forming "The Belfast Wardian Society." Thus associating Mr. Ward's name with the enterprise, and issuing a circular to be sent to fern lovers in other localities asking their assistance. Whom the Gods love are said to die early, I am sorry to say this society died early, too few members.

In 1860 Professor Jukes gave a course of lectures on Geology, in Belfast, which were largely attended. This was followed in 1861, 1862, and 1863 by courses of lectures on Geology, Zoology, and Botany. I attended the botany classes taught by Ralph Tate, afterwards and still a professor of the subject in Australia. At these lectures I made the acquaintance of our valued friends, Mr. S. A. Stewart and Mr. William Gray, who from then have been good friends of mine, and who still survive to ride merrily on their hobbies.

These lectures prepared the way for something permanent, and in 1863 a List of Guarantors was brought before the members of these classes with the object of forming a "Belfast Naturalist's Field Club." It was largely signed; I find my name among the signatories, of whom 19 survive, and only 9 are now members of the Club. A meeting to form the Club was held in March, 1863. Dr. Browne in the chair, it was largely attended by ladies and gentlemen. A great number of names were enrolled, of whom I was among the first. Since the formation I have continued a member, and taken a deep interest in the Club's welfare. I was at the extra first excursion to Colin Glen on the day of the marriage of our present King. A most delightful day, and very much enjoyed. In 1863 I was elected hon. treasurer, in which post I continued until 1869. I was a member of Committee for several years after, until in 1890 I was again elected hon. treasurer, which post I still occupy, and this year the Club honoured me by electing me Vice-President. During these 38 years of the Club's existence, I joined in many of the excursions, always keeping my fern hobby well to the front, and adding to my collection and to my knowledge.

At the request of the secretaries I contributed the following papers to the Club:—

On March 23, 1865, George C. Hyndman in the chair—"Classification and Distribution of Ferns, with notices of some interesting varieties lately found in the locality."

On March 8, 1881, Mr. W. Gray, President, in the chair—"Carnivorous Plants: their structure and habits, with notices of some of the insects which frequent them."

On January 13, 1887, Canon Grainger, President, in the chair—"On the Reproduction of Ferns, specially on the observed phenomenon called apospory, with some remarks on hybridization."

On March 27, 1888, Mr. Hugh Robinson, President, in the chair—"Variations Observed in the Growth of Mistletoe; illustrated by growing plants."

On February 19, 1890, Mr. W. Gray, President, in the chair—"A Gossip about British Ferns and their Varieties, with notices of local finds, with illustrations."

On December 16, 1890, Mr. W. Gray, President, in the chair—"Strange Pets I have had."

At the annual meeting, 1900, Mr. Bigger, President, in the chair—"British Ferns and their varieties."

In 1885-6 R. Ll. Praeger and myself published as an appendix to the proceedings of the Club, "The Ferns of Ulster."

The Belfast Naturalists' Field Club included a great many botanists, but I am sorry to say not any special fern hunters, and consequently I had no one with whom to compare notes, and to be certain of species I had often to buy normal forms from English nurseries, which I afterwards found were plenty in this locality.

Mr. Ferguson, then curator of the Belfast Botanic Gardens, was very friendly, although not knowing much of British ferns, and to encourage their growth had classes for ferns included in the horticultural shows then held in the Botanic Gardens.

In 1860 I had the honour of winning the first prize of £5 for the best collection of 24 ferns in 12 inch pots. My competitors included Sir W. Verner, Mr. Walkington, and Mr. Philip Richardson, they having at that time the best collections of ferns. I continued my fern hunting on all favourable oppor-

tunities, and in that was often assisted by others in the knowledge of likely places for ferns, such as Sir Walter Scott has described—

“Where the copse wood is the greenest,
Where the fountain glistens sheenest,
Where the morning dew lies longest
There the Lady Fern grows strongest.”

Late in the fifties I was indebted to Mr. W. H. Patterson for my first excursion to Stormont Glens, where I found a fine form of *A. F. Fæmina*, the *Apuaforme*, which is crested like a fish's tail. Also to an excursion to Cultra Demesne, when the very fine form *Polys. Angularæ, Decompositum*, was found. Both of these forms are still in my collection.

Colin Glen was in the fifties a favourite hunting place, the upper glen especially, until the trees were cut down. This was an ideal place, just such as would recall the lines of Mr. Edwin Lees on the *Athyrium* :—

“When in splendour and beauty all Nature is crowned,
The fern is seen curling half hid in the ground;
But of all the green brackens that rise by the burn
Commend me alone to the sweet Lady Fern.”

“Polypodium indented stands stiff on the rock,
With his sori exposed to the tempest's rough shock;
On the wild, chilly heath *Aquilina* stands stern
Not once to be named with the sweet Lady Fern.”

“Filix-mas in a circle lifts up his green fronds,
And the Heath Fern delights by the bogs and the ponds;
Through their shadowy tufts though with pleasure I turn
The palm must still rest with the fair Lady Fern.”

“By the fountain I see her just spring into sight,
Her texture as frail as though shivering with fright;
To the water she shrinks—I can scarcely discern
In the deep humid shadows the soft Lady Fern.”

“Where the water is pouring for ever she sits,
And beside her the Ouzel, the Kingfisher flits;
There, supreme in her beauty, beside the full urn
In the shade of the rock stands the tall Lady Fern.”

“Noon burns up the mountain, but here by the fall
The Lady Fern flourishes graceful and tall;
Hours speed as thoughts, without any concern,
And float like the spray, gliding past the green fern.”

At an excursion to Colin Glen in 1858 with Mr. Thomas Malcomson, I found a *Scolopendrium* with a crenated margin

which to my great astonishment the next year produced its second growth of fronds variegated ; at this time ferns with variegation were not known. These fronds had a beautiful ivory white margin. I exhibited it at that year's fern show, and sent a frond and description to the *Gardener's Chronicle*, then edited by Mr. Thomas Moore, curator of Chelsea Botanic Gardens, and author of so many books on British ferns. He inserted the description in the *Chronicle* with some commendation.

Before this I was confined to the acquaintance of a few local fern lovers and hunters, but as soon as this notice appeared I had a letter from Mr. Clapham, Scarborough, then one of the foremost of fern collectors and cultivators, asking for a division, had it been any other I should have refused, but as Mr. Clapham had been very generous to the Wardian Society, I at once sent him a division. He placed it among his twelve best ferns, and the following year it was seen there by Colonel Jones, of Clifton, one of the greatest authorities on British ferns. He saw and was conquered by a desire to have a division also, which I gave him. He was greatly pleased with it, and thus a friendship was formed with the most pleasant results ; every new thing I found I shared with Colonel Jones, and he was most liberal in exchanges. This continued until his death in 1889, which was a great loss to every fern lover.

Mr. Clapham, among other ferns, gave me a division of his *A.F.F. Acrocladon*, which until then he had been very unwilling to give to others. This grew well with me, it was never known to have spores, and so was very scarce. Messrs. Sim, of Foots Cray, and Stansfields, of Todmorden, had each a division from me. By careful examination Stansfields found one spore case with a few spores, from which they raised quite a number of fine ferns of the same character, but much better. Thus through my finding this *Scolopendrium*, the way was opened for some of the most pleasant intimacies constantly refreshed by letters and exchanges of finds or raisings, and visits to each other which continued until the death of Colonel

Jones. Through his introduction I made the friendship of those who were then the giants of the cult—Mr. Wollaston, of Chiselhurst ; Dr. Fox, of Bristol ; Mr. Carbonell, of Usk ; Mr. Lowe, of Shirenewton Hall ; Mr. Fraser, Edinburgh, &c. Many of these I visited.

Numerous exchanges took place and my collection rapidly grew.

In 1860 I removed to Alfred Street where I had a fair sized yard. I covered most of it with glass, and brought all my treasures with me, and made a rockery, and had the water laid on for a fountain and watering ; Mr. Gray kindly helped in making this. I continued there until 1866 when I removed to Holywood, where I have resided ever since. This was the best move I could have made, I had a large garden, good soil and situation, and plenty of room for all kinds of alpine and ferns. After a visit from Colonel Jones, I was advised to plant my ferns all in the open ; just like other plants ; they succeeded well, and this is the best way, where the air is pure British ferns do not require coddling in a greenhouse.

“Do not be afraid of ferns. They like being moved and divided and will forgive almost anything but neglect.” Such a garden as I have is within the reach of most people, and need not be confined to the well-to-do.

It has been my good fortune to meet in England many working men, with a tiny plot, who have fine collections of ferns, the results of their own fern hunting and raising, and careful attention.

“Yes, in the poor man’s garden grow, far more than herbs and flowers—kind thoughts, peace of mind, and joy for weary hours.”

“Whatever cheerful and serene supports the mind, supports the body too.”

I hope some more of the members will take up the study with vigour, do not be afraid of the difficulty of learning, collect any ferns you may find and plant them, you will then by observation notice the differences in species and varieties.

A well-stocked fernery, and Moore's hand-book of ferns, will teach a beginner in a few lessons, more than a month's study of all the learned books on ferns published. The biography of a good man is a pleasant thing to read, but to see that man face to face, and to know him personally is far better.

After this acquaintance by sight, the study of little peculiarities, aided by magnifying glasses and by the experience of others, is made doubly interesting.

About 20 years ago Mr. R. Lloyd Praeger took up the study of ferns, and was with me on many excursions when good finds were made ; he became a successful hunter and made a good collection, the best of which he has now in Dublin.

For many years business took me constantly travelling over the North of Ireland, and, with my love of ferns, I availed myself of opportunities to visit glens and mountains, and walking between one railway station and another along old roads rich in ferns. I made a rule always to have the proper tools with me—a steel pick, a fern trowel, cord, and a good canvas bag. If unprepared and a find is made, if not then secured the chances are that it never will be again.

Mr. Druery says :—"It is astonishing how few people, even among plant lovers, are aware that in our British ferns and their varieties, we have something absolutely unique in the world, and unparalleled anywhere outside our little group of islands, despite the fact that elsewhere in many places ferns are far more abundant, and species far more numerous."

"No collection can be made of any other class of plants, without some aid from outside ; either the plants themselves are originally exotic, or the varieties are due to culture abroad as well as here."

"But with our British ferns not only have we many hundreds of lovely and diverse forms, every one of which is of home origin, either as a wild find or derived therefrom in this country, but in no other part of the world has a tithe of such diversity been found to exist, even in those places which are infinitely better endowed with raw material than we are."

"Whether this singular fact is due to a greater capacity for sporting in our native species, owing to climate or other conditions, or whether it is due to the fact that here alone we have had a persistent coterie of fern hunters, engaged for half a century in this cult, cannot with certainty be said."

The counties to which my attention was given were Antrim, Down, Derry, Armagh, Sligo, Leitrim, Louth, Wicklow, Dublin, in Ireland, and Westmoreland in England. These counties are full of glens and ravines, and in all parts full of ferns, that well repay the hunter. One cannot be a fern hunter alone, so many other objects of interest arise, that one is obliged to notice them. Besides ferns I made a good collection of alpine plants and shrubs.

Views of mountain and heath and moorland always had charms for me, our own counties have scenes which could be fitly described by the following poetical description :—

"A wealth of heather glimmering far and wide,
Pink spray, and crimson tuft, and waxen bell ;
A thousand spears of yellow asphodel
Guarding each hollow where marsh mosses hide,
And butterworts and sundews brown abide ;
A mountain tarn where pale lobelias dwell ;
Grey lichened rocks all slanted down the fell,
And far-off hills with purple splendours dyed ;
Such picture I would grave upon my soul,
That, in some day of weary toil and care,
When the world's hoarse, loud clamours round me roll,
I may turn inwards from the din and glare,
And for one moment all these fair things see,
And cheer me with the beautiful and free."

When I commenced fern hunting in 1885 comparatively little was known of what we call varietal development. The history of the British fern varieties is almost wholly comprised within the last fifty years. Before 1850 only some half-a-dozen to half-a-score of varieties seem to have been recognised. From that time forward each year produced new forms by diligent hunting, the names of which would take too long to enumerate, but are very fully given in Dr. Stansfield's paper on the subject.

In his remarks on the finds of each year, he says—"The year 1877 is famous for the discovery of two very fine angulare

varieties by Mr. Phillips—viz., his *Polystichum rotundatum* and his *setoso cuneatum*, two of the best things Mr. Phillips has found.”

“If we look backwards instead of forwards we are confronted with the fact that when Queen Victoria ascended the throne there were apparently no fern lovers at all, and certainly no collections of varieties worthy the name.”

The late Colonel Jones, of Clifton, that *facile princeps* of fern hunters and raisers, in a paper read before the Bristol Naturalists' Society, 1888, after enumerating the ferns found in the neighbourhood of Bristol and Somerset, says—“It was in the lower parts of the Quantock district that the late Mr. Elworthy, many years ago. made his remarkable finds in *Polystichum angulare*, which helped to give a greatly increased interest in the study of British ferns, and subsequently Mr. G. Wollaston, Rev. C. Padley, Dr. Willis and Colonel Jones found many fine and distinct varieties in the same district. Nor may it be without interest to bear in mind that this is the same district which formed Mr. Elworthy's happy hunting ground, and that Mr. Percival made his remarkable discovery of Devonian corals, not less beautiful than geologically interesting, it would show that the affinity between this part of Somerset and South Devon, where so many of the finer forms of *Polys. angulare* have been found, is not merely superficial.”

“Nor may it be unworthy of notice that that energetic discoverer, Mr. W. H. Phillips. has proved, by his researches, that a certain marked botanical affinity exists between the south-west of England and Ireland, the north especially. There are certain marked forms of *Polys. angulare*, of which single plants had been found in the West of England, and which, after very exhaustive researches, having never been found in any other part of England, had long been classed among the ferns peculiar to the south-west. Yet, after all this had been comfortably settled, Mr. Phillips turns up with his inconvenient discoveries, and unsettles everything. If there were two ferns which had earned the character of being entirely

unique, those ferns were *Polys. Ang. Rotundatum*, of Elworthy a Somerset form, and *Polys. Ang. Acrocladon*, of Mapplebeck, found in South Devon. Mr. Phillips produces unmistakeable counterparts of both (*Rotundatum*, found at Ligoniel, and *Acrocladon*, found on the road to Sugar Loaf Mountain, Co. Dublin.)”

“Another most rare and marked form, *Polys. Ang. Brachiato Cristatum*, which long experience seemed to have been proved conclusively to be peculiar to the South of England, Mr. Phillips also finds in the North of Ireland, in Co. Fermanagh.”

It was exactly the same with another rare and beautiful form, *Polys. Ang. Setoso-Cuneatum*, found in the Deerpark, Belfast, of which only two plants had ever before been found, one by Mr. Moly, the other by Mr. Wollaston, both in the south-west of England.

To these may be added the *Polys. Ang. Divisilobum Phillips*, found at Castlecoole, on which Mr. Wollaston has passed judgment as a gem of the first water. This closely resembles the celebrated *Divisilobum Wollastonii*. and the *Divisilobum Crawfordiae*, commonly called in this neighbourhood the Crawfordsburn fern.

I may notice that of *Divisilobes* 16 were found in the United Kingdom—3 in Somerset, 7 in Devon, 1 in Hants, 5 in Ireland, of which 3 were by myself.

In 1892 the North of England Pteridological Society was formed, of which I became a member, afterwards its name was altered to the British Pteridological Society. This Society is entirely devoted to the science of ferns in all their aspects. We have our meeting always on the first Monday in August in each year, nearly always at Windermere, at which papers are read, new forms exhibited and named. This brings together a large number of experts, and is a great enjoyment, and a great opportunity to meet the members, who come from all parts of the united kingdom. On several occasions the Society invited me to read papers. In 1894 I read a paper on “Some of the Results of Fern Hunting in Ireland;” in 1898 a paper

on "Polystichum Angulare Proliferum, Past, Present and Future ;" in 1899 a paper on "Lastrea Filix Mas, its Past and Present Divisions."

When the business meeting is over we often visit the collections of ferns at Windermere and Kendal, belonging to members, and if the weather permits, on following day, we have a charabanc and make an excursion to some of the mountains and valleys where ferns abound. In this way I have acquired a good knowledge of Westmoreland and added some good ferns to my collection.

The counties of Ulster cannot be surpassed for places for hunting ferns and alpine plants, and for the finest scenery, will compare favourably with any other part in the United Kingdom. As to ferns, out of the 46 species of ferns indigenous to Britain and Ireland, Ireland yields 33 species, and the province of Ulster 32 species, only one less than the whole number, the missing species being *Trichomanes Radicans*. The varieties recorded number 150 of which *Polystichum Angulare* is credited with 55, and *Athyrium* with 30.

Lord Lytton says that the face of Nature is the only face that as we grow old never changes to us. Friends grow old, change and pass away, but the old oak of our youth is the old tree still. The hill has still the same shadows, the valley the same musical river.

One of our poet bishops, since gone to his rest, wrote as follows to a clergyman of his diocese who had promised to go with him to Connemara, but was prevented by engagements. The description is very humorous, and would almost describe some of our Ulster scenes, say Newcastle :—

DERADDA LODGE, CONNEMARA.

Dear Fowler, I think, on the whole, you'll agree with me,
 'This p ace is delicious (I wish you could be with me);
 But especially charming to one who has got any
 Fancy for fishing, conjointly with botany.
 Just think, when on land from your boat you get out,
 Having captured a salmon, or ten or twelve trout,
 As you lounge on the margin, enjoying your lunch,
 You suddenly find that your cushion's a bunch

Of what we consider our fairest of spolia,
 Menziesia to wit, species polifolia.
 Then you stretch your cramped legs, you stroll off a short way,
 And lo ! there's the heath that is named Mackay ;
 Or perchance you may find (you know it most rare is)
 Another heath bearing the name Ciliaris ;
 Or even by luck, one outrivalling any— a
 Bush of the Erica Mediterranea.
 Then look in that ditch, there's a prize for Herbaria,
 The true intermediate Utricularia.
 You will know it, without any flower or fruit,
 By the groups of small bladders apart from the root.
 Then in casting your fly you hook into a weed—
 Draw it in—why, what is it ? a rush or a reed ?
 No, the treasure you've hooked in that cast so unwary
 Is the Eriocaulan Septangulare !
 When the salmon have baffled your patience and skill,
 Take half a day off, and walk over the hill,
 And there on the rocks (it's no fiction or phantom)
 Grows the real unmistakeable Adiantum.
 While in that little lake which the sea breezes fall on,
 All full of lobelia and Eriocanlon
 (In vain the green depths of its waters defy us),
 With a gaff we secure the much coveted Naias.
 Now, I think my dear Fowler, I've well proved my case,
 That this is a most undeniable place ;
 And once more I wish you were with me to fish up
 Big trout and rare plants !—Your affectionate Bishop.

Mr. Lowe, in his book on 50 years experience in fern growing, says—among those who devoted themselves to what has been termed fern hunting, *i.e.*, a search in order to discover new wild varieties, none have been so successful as——. A long list of names, of whom only 6 are now alive ; two of whom are members of this Club, Mr. R. L. Praeger and myself. And I may mention that this book of Mr. Lowe's has many references to my work, and in his " British Ferns and Where Found " he has made 70 references to me and described many of my finds.

As I have mentioned, fern hunting of wild varieties was, up to a recent period, the only way in which novelties and varieties could be had. In 1858 experiments were made in crossing, and in 1867 it became an acknowledged fact that ferns could be crossed ; experiments had for some time been going on in this direction, but the results were generally discredited until then. Mr. E. J. Lowe and Colonel Jones were the first to

thoroughly experiment on the possibilities of crossing and on their successes.

Mr. Lowe thus writes: "The interest in the varieties of British ferns ought to increase, now the crossing of varieties has become an acknowledged fact, alike on account of the extreme beauty of many of the crosses already effected, and because also, however beautiful crosses already obtained are, it may be confidently asserted, that they are nothing to what will be accomplished when exhaustive experiments, guided by tasteful and judicious selection, shall have been made. Though much will depend on selection, there will always be enough left to the element of chance to keep up the interest. We may liken the prospect of endless combinations, to the combinations in bell ringing, and we learn that the changes in the ringing of twelve bells amounts to forty millions, we can scarcely conceive of the immense field of inquiry that is opened in these investigations. The number of forms to be obtained is past conception, and as the discovery of one truth is the stepping-stone to the discovery of even greater truths so every new form that is raised enables the raiser, or those following in his footsteps, to produce countless other combinations."

About 1885 the mode of growth called apospory, was discovered by Mr. Druery, on *Athyrium F. F. Clarissima*, this is the formation on the back of the frond where the spore cases are developed, of bulbils, which afterwards, on being pegged down on damp earth, produce prothallia, from which fronds spring up, and become separate plants.

Mr. Gosse, in his *Naturalists Rambles on the Devonshire coast*, has called attention to many of its charms and wonders, both scenic and marine. He has done a good deed, as every one does who presents new objects of interest and research to those who, living habitually in romantic scenes, forget to notice them, and, surrounded by many of the most marvellous of God's creatures, know neither their habits or their nature.

Some indeed may inquire, "What is the advantage of knowing the names of a set of weeds, which are of no use to any-

one?" "Of no use?" That is a question not for us to solve. At any rate are many of your employments more useful? Are all so innocent? Ask the worn out, heart-wearied man yonder, who has escaped for one short month from his stool in a city office; ask him if there be not a use in the exquisite and various forms and colours of the sea weeds he is turning over on the beach. He will answer, "It does me good to look at them; it refreshes my soul; it makes me young again!"

Of no use? That is too easily assumed, and implies surely a forgetfulness of him that made them. It does not necessarily follow that a thing is useless because we happen to be ignorant of its use. We ought to believe, we ought to be sure, that the lowliest flower or insect has, though it may be unknown to us, a real use in God's economy.

"Behold the lilies of the field, how they grow!" These gaily dressed flowers had their use. It was their mission (could they have a higher?) to become preachers to men, of reliance on God for meat, drink and clothing. Who will deny the fascination which flowers of the choicest kind exercise over all? But to how few are they accessible!

The costly greenhouse, the highly-paid gardener, are requisite for their possession; but what do the wild flowers cost? Only the trouble of picking them; and they, if people take the pains of looking for, and examining them, have quite as many, though more humble, charms than their more aristocratic relations.

"Here! smell this bunch of Butterfly Orchis. Did ever a greenhouse produce a flower with more exquisite scent?"

"But where did you find it? I never saw it before."

"Good friend, I plucked it by the side of a road you have passed a hundred times. Look at these daffodils! Where will you find colour more brilliant, texture more delicate?"

"But they are such vulgar flowers; they are so common!"

"My friend, I fear you are very vulgar, for men and women are very common on the earth."

So the sum I have to add up of what I have written about

seems very small, although it has taken 40 years to collect together the parts of which it is composed. But what amount of figures could tell of all the happiness that has been connected with the ferns, whose stories I have been telling; happiness to myself and others, the pleasant days, the merry hours; hours of pain forgotten; hours in which, when alone, the soul winging itself from the material things around, has flown up on bright thoughts to the blessed world whence it came.

12 *April.*

The last meeting of the Session was held at the Museum, J. M. Dickson, Esq., in the chair. During the half-hour gossip the structural details of Belemnites, Ammonites and Nautili were discussed and illustrated by a series of instructive specimens collected by the members.

At 8 o'clock the formal meeting commenced when Mr. William Gray, M.R.I.A., submitted his report as delegate to the Dover meeting of the British Association. The Belfast Naturalist's Field Club is one of the corresponding societies connected with the British Association which undertakes local scientific investigations, and publishes notices of the results. A conference of delegates is held at each meeting of the Association at which matters relating to the work done by the local societies are discussed, also the promotion of more systematic observations and plans of operation, and greater uniformity in the mode of publishing results. Mr. Gray, having referred to the work done and the proposed improved arrangements for the accommodation of the Annual Conference of Delegates, reported on the steps taken by the Field Club for inviting the British Association to Belfast, and the favourable reception given to the deputation from Belfast at the Dover meeting of the General Committee of the British Association.

REV. M. FAHY.—“ANTIQUARIAN AND NATURAL
HISTORY NOTES OF THE PARISH OF DUNEANE
AND BARONY OF TOOME.”

He stated that the Parish of Duneane is bounded on the west by the River Bann, on the south by Lough Neagh, it even extends into the Lough, including what is known as the Three Islands. The Parish and Church are of very ancient date, extending back to the 6th century, if not earlier. The places of interest are Duneane Church, Church Island and Cranfield. The name Duneane is said to be a corruption of Dun da Een—the fort of the two birds. Tradition has a legend about the founding of the Church by St. Patrick, but this honour is also divided between two others—St. Erenach and St. Brigid. The Church of Duneane is small, measuring 54 feet by 26. The oldest portion is the east gable which is not less than 500 years old. The Parish of Duneane consisted originally of four townlands, or, as they are called, the four towns. Previous to the Dissolution these belonged to the Abbey of Kells.

Toome Castle was built by De Courcy to command the celebrated pass of the Bann, over which the different septs in Antrim and Derry passed on marauding expeditions, or for purposes of retaliation. Not long ago the haunt of a great maurauder, supposed to be Arte Oge O'Neill, was found in Aghaloughan Bog, about three miles east of Duneane Church. The place was constructed of strong piles of oak driven into the ground. During drainage operations objects were dug up. The lecturer dealt in considerable detail with the history of Toome Castle, of which the last record was that in 1783 the ruins of the Castle were taken to build the bridge by Lord O'Neill.

Raths and souterrains were then dealt with, after which the lecturer proceeded to describe the natural history of the locality in an interesting manner.

16 April.

MR. A. M'L. CLELAND.—“A RECENT TOUR OF THE
ROMAN WALL.”

At the meeting held in the Museum on Tuesday evening 16th April, the Vice-President in the chair. Mr. A. M'L. Cleland read a paper on “A Recent Tour of the Roman Wall.” After a few introductory remarks explaining the *raison d'être* of the Wall the lecturer showed ruins of several fine buildings which had been erected from the materials derived from the time of defensive works raised by the Romans from the Solway and the Tyne. Those buildings include the beautiful priory at Lanercost, whose walls have incorporated many Roman memorials, and whose crypt holds several finely-executed Roman altars.

The manner in which the wall was built was next described, sketches of the inscribed rocks in one of the old quarries being shown as well as sketches of the manner in which the stones were wrought. Then several views were shown of fragments of the wall as at present existing, including one in which the wall appears through the surface of the old military road laid out by the Government towards the latter end of the 18th Century, and which was really a revival of the road made with such wise forethought by the Roman Government in the 2nd Century.

Passing from this the wall was shown creeping along the edges of the steep crags in the centre of Northumberland, at an altitude exceeding that of Cave Hill, and still maintaining a height of over five feet. The next three views showed the ditches of the Wall and the Vallum, where they had been cut through hard basalt, the broken and excavated blocks lying on the tops of the banks as they were left by the British labourers, impressed by the Romans, seventeen centuries ago.

After a short description of the castles (erected at every mile), and the turrets, or stone sentry boxes, (placed on the wall at every furlong), the lecturer dealt with the remarkable

remains of the old bridge, built by the Romans, about the year 173 A.D., over the north Tyne at Chesters. The ruins are an excellent instance of the splendid work the Romans put into their buildings.

Then the lecturer passed on to speak of the camps, or fortified cities, maintained by the Romans along the line of the wall, eighteen in all, some of them covering as much as $5\frac{1}{2}$ acres. The camps were dealt with in detail, excellent views being shown of ramparts, gates, guard-houses, officers quarters, treasure vaults, a market place, and, most interesting of all, the latest discovered street, the houses being built by the forced labour of men whose descendants now represent the largest empire the world has ever seen.

After this a series of nine views was thrown on the screen, shewing details of the remarkable building at Citernum, which has either been used as a bath or a villa. Several rooms were shown, including one containing the curious series of seven niches or alcoves. Examples were given of the way in which the rooms were heated with hot air, some of the original plans still remaining in situ.

The remaining portion of the lecture was devoted to an imaginary sketch of the life of a Roman soldier on the Wall from the time he landed at Dover till he received his discharge. This discharge, engraved on tablets of bronze, conferred on the time expired soldier all the privileges of citizenship, and enabled him to contract a lawful marriage, provided he was content with one lady at a time.

The lecture occupied an hour and a half in delivery and was followed with great attention by a very appreciative audience. Most of the views shown were from photos taken by Mr. Cleland when in Northumberland last year.



R U L E S

OF THE

Belfast Naturalists' Field Club,
1900-01.

I.

That the Society be called "THE BELFAST NATURALISTS' FIELD CLUB."

II.

That the object of this Society be the practical study of Natural Science and Archæology in Ireland.

III.

That the Club shall consist of Ordinary, Corresponding, and Honorary Members. The Ordinary Members to pay annually a subscription of Five Shillings, and that candidates for such Membership shall first pay an entrance fee of 5/-, and be proposed and seconded at any Meeting of the Club, by Members present, and elected by a majority of votes of the Members present.

IV.

That the Honorary and Corresponding Members shall consist of persons of eminence in Natural Science, or who shall have done some special service to the Club; and whose usual residence is not less than twenty miles from Belfast. That such members may be nominated by any Member of the Club, and on being approved of by the Committee, may be elected at any subsequent Meeting of the Club by a majority of the votes of the members present. That Corresponding Members be expected to communicate a Paper once within every two years.

V.

That the Officers of the Club be annually elected, and consist of a President, Vice-President, Treasurer, Librarian, and two Secretaries, and ten Members, who form a Committee, and shall hold not less than eight Meetings in the year. Five members to form a quorum. No Member of Committee to be eligible for re-election who has not attended at least one-fourth of the Committee Meetings during his year of office. That the office of President, or that of Vice-President, shall not be held by the same person for more than two years in succession.

VI.

The Committee may from year to year appoint a Sectional Committee as may be considered desirable to further original investigations in any one or more departments of the Club's work. Each Sectional Committee to be composed of six members of the Club, not less than two being members of the Club's Committee. No financial responsibility to be incurred by the Sub-Committee or any officer of the Club without the previous approval of the Club's Committee. Any Sub-Sectional Committee may elect its own Chairman and Secretary from its members.

VII.

That the Members of the Club shall hold at least Six Field Meetings during the year, in the most interesting localities, for investigating the Natural History and Archæology of Ireland. That the place of meeting be fixed by the Committee, and that five days' notice of each Excursion be communicated to Members by the Secretaries.

VIII.

That Meetings be held Fortnightly or Monthly, at the discretion of the Committee, for the purpose of reading papers; such papers, as far as possible, to be original and to treat of the Natural History and Archæology of the district. These Meetings to be held during the months from November to April inclusive.

IX.

That the Committee shall, if they find it advisable, offer for competition Prizes for the best collections of scientific objects of the district; and the Committee may order the purchase of maps, or other scientific apparatus, and may carry on geological and archæological searches or excavations, if deemed advisable, provided that the entire amount expended under this rule does not exceed the sum of £10 in any one year,

X.

That the Annual Meeting be held during the month of April, when the Report of the Committee for the past year, and the Treasurer's Financial Statement shall be presented, the Committee and officers elected, Bye-laws made and altered, and any proposed alteration in the general laws, of which a fortnight's notice shall have been given, in writing, to the Secretary or Secretaries, considered and decided upon. The Secretaries to give the Members due notice of each intended alteration.

XI.

Members of other Irish Field Clubs residing temporarily or permanently in or near Belfast may be enrolled members of the Club without election or entrance fee on production of a voucher of membership of another Club, and without subscription for the current year on production of a receipt showing that such

subscription has been paid to another Club. Failing the production of such receipt, the usual subscription for the current year to be paid to the Treasurer on enrolment. The names of members so admitted to the Club to be published with the notice of meeting following the date of their enrolment.

XII.

That, on the written requisition of twenty-five Members, delivered to the Secretaries, an Extraordinary General Meeting may be called, to consider and decide upon the subject mentioned in such written requisition.

XIII.

That the Committee may be empowered to exchange publications and reports, and to extend the privilege of attending the Meetings and Excursions of the Belfast Naturalists' Field Club to members of kindred societies, on similar privileges being accorded to its members by such other societies.



RULES FOR THE CONDUCTING OF EXCURSIONS.

I. The excursion to be open to all members, each one to have the privilege of introducing two friends.

II. A Chairman to be elected as at ordinary meetings.

III. One of the Secretaries to act as Conductor, or, in the absence of both, a member to be elected for that purpose.

IV. No change to be made in the programme, or extra expense incurred, except by the consent of the majority of the members present.

V. No fees, gratuities, or other expenses to be paid except through the Conductor.

VI. Every member or visitor to have the accommodation assigned by the Conductor. Where accommodaton is limited, consideration will be given to priority of application.

VII. Accommodation cannot be promised unless tickets are obtained before the time mentioned in the special circular.

VIII. Those who attend an excursion without previous notice will be liable to extra charge, if extra cost be incurred thereby.

IX. No intoxicating liquors to be provided at the expense of the Club.

NOTICE.

EXCHANGES OF PROCEEDINGS.

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Prof. Charles Wright Dodge.

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PROCEEDINGS
OF THE
Belfast Naturalists' Field Club.

APPENDICES, VOL. II., No. 4.

1893-4.

LEPIDOPTERA
TAKEN IN THE BELFAST DISTRICT.

By CHARLES W. WATTS, F.I.C.



LEPIDOPTERA

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INTRODUCTION.

[*Read 20th February, 1894.*]

The entomologist living in Belfast has within his reach many places where he can capture his game. For short excursions, the range of hills from the Knockagh to the White Mountain is probably the best ground, including, as it does, wooded glens such as Collin Glen, the chalky slopes of the eastern faces, and the moorland and bogs of the higher parts of the hills. Each of these has its characteristic flora, and, feeding on the plants, we may expect an insect-fauna to correspond.

Nearer home than the hills are productive spots like the marshes by the Lagan, and the Bog Meadows, and the lanes and hedgerows produce plenty of common insects, besides some better species among the Micro-lepidoptera.

Further afield, but still within a day's excursion, are Islandmagee and the coast just north of Larne, and on the Co. Down side, the shore and the numerous plantations, especially the woods about Helen's Tower.

Inland in both counties we cannot expect great results. The country is more or less cultivated, and on such ground only the commonest species occur, but these sometimes swarm in particular places.

Of the more distant localities within the district the Mourne Mountains are undoubtedly the best, and after them, the Glens of Antrim, particularly Glenarm, and the sandhills of Portrush,

Ballycastle, and Dundrum. I have no experience of the Antrim hills north of Larne, but they are so similar to the Belfast hills that their fauna is probably very much the same.

I will now proceed to describe some of these localities more particularly, and mention some of the insects that occur in each. It will, of course, be understood that I do not imply that these are the only, or the best places for collecting, but that they are the places with which I happen to be familiar, either because they were convenient to the part of the town where I lived, or because they were favourite places for holiday-making.

About a quarter of a mile north of the second lock on the Lagan there are some low-lying marshy fields. To the N. and E. the ground rises pretty steeply, and in the N.E. corner is a pond. Along the side of the slope is a disused water-course, which formerly, I believe, supplied the town. It is now filled with water-plants, *Sparganium*, *Iris*, and various reeds and grasses. When in flower in June and July these reeds attract numbers of *Noctuæ*, the larvæ of which feed on the leaves in the autumn and spring. The most abundant species are *Leucania pallens*, *impura*, *comma* and *lithargyria*; *Tapinostola fulva*, *Noctua umbrosa*, *baja*, *c-nigrum*, *festiva*, *rubi*, and *xanthographa*, *Apamea leucostigma* and *didyma*, the last in great numbers and infinite variety of colour and markings.

Earlier in the season several species of the genus *Tæniocampa* may be found feeding at the blossom of the willow at night. Flying over nettles and flowers in the summer, we may net *Plusia pulchrina*, *chrysitis* and *festuæ*, *Dianthæcia nana* and *capsincola*, whose larvæ feed in the seed capsules of *Silene* and *Lychnis*. To capture these *Noctuæ* in the summer months, the collector must keep late hours, for they do not settle down to feed till it is really dark, and in these latitudes that is not before half-past ten. From this time until midnight they can be taken off grass and reed flowers by the simple process of enclosing them in a chip-box after examining by the light of a lantern to see whether they are worth taking. They seldom attempt to fly; at the most, they sometimes drop to the ground or into

the water, as the case may be, for the grasses actually growing in the old water-course are by far the most attractive. The collector must be prepared to get his feet wet, or lose most of his moths. The only scarce Geometer that occurs in the marshes is *Phibalapteryx vittata*. The larva of this moth feeds on *Galium palustre*, and the moth is extremely abundant in June, both in these marshes and in the Bog Meadows. It is usually a scarce species in Ireland, so that it may fairly be claimed as a local speciality.

Along the rough hedge at the top of the hill we may capture a number of species, mostly common, but *Emmelesia decolorata* is a good thing, which is abundant here. Only the commonest butterflies can be expected in such a locality, and it is hardly worth visiting in the day-time, except for Micro-lepidoptera, of which a number of common species occur. On the banks of the river I have found the curious larva of the *Chærocampa elpenor* (Elephant Hawk) feeding on *Epilobium hirsutum*, and the larva of *Smerinthus populi* is common on the willows. *Epione apiciaria* also feeds on the willows along the river, and the moth, which is scarce in Ireland, may be netted while flying at dusk in August. *Cataclysta lemnata* feeds on *Lemna* in the pond and ditches, and *Hydrocampa stagnata* on *Potamogeton* in the pond. Several species of the genus *Scopula* are common, and a number of *Tortrices* and *Tineæ*, but nothing rare has turned up here. Altogether, I have taken 103 species of butterflies and the large moths in this one field, besides Micro-lepidoptera.

Collin Glen is one of the best collecting grounds in the immediate neighbourhood of Belfast. It is at its best in May and June. Later in the year the vegetation gets so rank that it is difficult to collect in the upper glen, which is the best part. The fauna of the upper and lower glens differs considerably, as might be expected from the different character of the ground. In the lower glen the trees are larger and the ground more open, but on the whole the results of collecting, either by day or night, are disappointing. I have tried here the well-known

method of spreading what is called "sugar" on the trees to attract *Noctuæ*, but it has never proved a success. Indeed, the same may be said of every place that I have tried, except the Donard demesne at Newcastle. The cause is probably the dampness of the majority of the otherwise suitable localities, including most of the wooded glens in the district. Two of the less universal butterflies occur here, namely, *Pararge egeria* (Wood Argus) and *Epinephele hyperanthus* (Ringlet), the former being very common. *Euchloë cardamines* (Orange-tip) is also common in the glen, and still more so on the mountain just above, where I have taken specimens of a dwarf race. *Macroglossa bombyliiformis* is common at the top of the glen; the larva feeds on *Scabiosa succisa*, and the moth is fond of the flowers of *Pedicularis*. Of the *Bombyces*, *Spilosoma fuliginosa* is common, also *Lophopteryx camolina* and *Thyatira derasa* and *batis*. The *Noctuæ* include *Miana arcuosa*, *Grammesia trigrammica*, *Dianthæcia nana*, and *Plusia pulchrina*, and of the *Geometræ*, which are more abundant, the commonest are *Metrocampa margaritaria* (Light Emerald), *Selenia bilunaria*, *Odontopera bidentata*, *Cabera pusaria* and *exanthemaria*, which fly in swarms about dusk, *Strenia clathrata*, *Eupithecia lariciata* among the larches in the higher parts, *Hypsipetes impluviata* among alder, *Melanthia bicolorata* and *ocellata*, *Anticlea badiata* and *nigrofasciaria* and *Cidaria silaceata*, of which the larva feeds on the enchanter's nightshade.

We are on very different ground when we come to explore the hills, and we meet with an entirely different insect fauna. Species which are universal on the lower ground are entirely absent on the heather, and naturally the heath-feeding species do not occur away from the food-plant. Besides the heath species there are several which feed on *Vaccinium*, on various low plants, on ferns and grasses, and on *Salix repens*. The last is comparatively scarce on most parts of the Belfast hills, so that the fauna is poorer than it would be if this favourite food-plant were more abundant. On the steep eastern face of the hills many plants grow which are not to be found off the Chalk,

and this peculiar flora results in a peculiar fauna, many species, particularly among the micros, occurring here, and nowhere else in the district except on similar ground along the Antrim coast.

There are no butterflies peculiar to the hills, but *Lycæna icarus* (Common Blue) and *Polyommatus phlæas* (Copper) are common on the Chalk. *Cænonympha pamphilus* is to be found all over the hills, and *Euchloë cardamines* wherever *Cardamine pratensis* grows.

Of *Sphinges*, *Macroglossa bombylifformis* is common, and *Zygæna filipendulæ* on the east of Black Hill.

Of the *Bombyces*, *Nemeobhila plantaginis* is rather scarce, but *Saturnia pavonia* (Emperor) is common. The larvæ of this moth, and of *Bombyx rubi* are to be found feeding on heath in the autumn, and the curious cocoon of the Emperor is a familiar object in winter.

Several good *Noctuæ* occur, and *Celæna Haworthii*, *Stilbia anomala*, *Noctua glareosa* and *festiva*, *Agrotis strigula*, and *Hadena glauca* and *adusta* are all fairly common. Some good varieties of commoner species also occur on the higher ground, *Triphæna comes* and *Noctua xanthographa* being especially remarkable. Of the *Geometræ* may be mentioned *Ematurga atomaria*, *Oparabia filigrammaria*, *Larentia cæsiata* and *salicata*, *Eupithecia satyrata*, var. *callunaria*, *E. nanata*, *Phibalapteryx lapidata* in marshy places, *Cidaria populata*, *C. testata*, and *Anaitis plagiata* among *Hypericum* on the east side of Black Mountain.

Two species of Plume moths are common on Black Hill, viz., *Mimesioptilus bipunctidactylus* and *pterodactylus*, and last autumn I took a specimen of the very rare *Platyptilia isodactyla* on marshy ground between Divis and Black Hill, where its food-plant grows abundantly.

A number of characteristic *Tortrices* occur, principally among heather. Of these the following are worth mention:—*Tortrix viburnana*, *T. palleana*, *Peronea caledoniana*, *Mixodia Schulziana*, *Catoptria hypericana*, *Eupœcilia ciliella*, *Argyrolepia Hartmanniana* and *Xanthosetia zægana*.

The Knockagh near Carrickfergus is of a similar character, but there are several insects to be found there which do not seem to occur either on the Belfast hills or on Islandmagee. *Lycæna minima* (Little Blue) occurs about the top of the cliff, this being also the favourite ground for several good species, such as *Melanippe tristata*, *Nemeophila plantaginis*, *Ennychia cingulata*, *Oxyptilus parvidactylus*, and *Scoparia ingrattella*, most of which seem peculiar to this hill, at least so far as our district is concerned.

The cliffs and slopes of Islandmagee between Black Head and Gobbin Head are very productive. The morning is the best time here, for in the afternoon the sun soon gets behind the hill and the temperature falls rapidly. Of the night-flying insects I know nothing, as the locality is too far for walking back after work, and there is no late train to town.

Lycæna minima is exceedingly abundant here in June, and may be seen wherever *Anthyllis vulneraria* grows. The tiny larva feeds in the woolly flower-heads of this plant, but is very difficult to find. *Lycæna icarus* is common, also *Pararge megæra*, *Vanessa urticæ*, *atalanta*, and *cardui*.

Nemeophila plantaginis is commoner here than anywhere else in the district and in some years is exceedingly abundant. *Spilosoma fuliginosa* occurs, and the larvæ of *Bombyx quercus*, var. *callunæ* may be collected in June, feeding on bramble.

Of the other families of Lepidoptera may be mentioned *Strenia clathrata*, *Emmelesia albulata*, and *Eupithecia constrictata* among the *Geometræ*; *Scopula ferrugalis*, *Acipitilia tetradactyla*, *Homeosoma senecionis*, and *Phycis subornatella* among the *Pyralides*; and *Peronea Schalleriana*, *Penthina gentiana*, *Sericoris littoralis*, and *Conchylis straminea* among the *Tortrices*.

Plutella cruciferarum (the Diamond-back Moth), which has sometimes completely destroyed the crops of turnips and other cruciferous plants in England, is fairly common here, but I have never seen any sign of damage, so it may be hoped that the climate is unfavourable to its multiplication.

Glyphipteryx equitella and *Fischeriella*, tiny black and silver species, are to be found on grass, flying about 4 P.M. in the sunshine ; several species of *Argyresthesia* and *Elachista* are also to be found. In all probability much the same species occur at many similar spots along the Antrim coast, and a number of species are recorded from Glenarm, but these places are beyond a single day's excursion. At Glenariffe I have taken *Larentia olivata*, which is rare in Ireland, and no doubt the locality would repay investigation, though it is not well suited for night work.

On the north coast of Antrim, the sandhills of Ballycastle and Portrush are splendid collecting grounds for those species that frequent such places. At Ballycastle the very local *Nyssia zonaria* is plentiful at the beginning of April. So far this species is only recorded, in Ireland, from Ballycastle and Achill Island. It occurs also in the Isle of Man and on the coasts of Cheshire and North Wales.

I now come to the districts in County Down, and shall confine my remarks to the Mourne Mountains, and more particularly to the immediate neighbourhood of Newcastle, which is the best centre for collecting.

To the west of Newcastle there is a fine stretch of sandhills stretching to Dundrum Bay ; at the back of the village are the woods of Donard demesne, perhaps the best woods in our district, and beyond the woods are the mountains. Each of these produces its special insects, which, for the most part, are not to be found in the others. The best part of the sandhills begins about two miles from Newcastle and extends to Dundrum Bay ; they are continued on the opposite side of the bay, but this part is too distant for convenient working.

Two butterflies are abundant all over the sandhills, *Lycæna icarus* and *Satyrus semele* (Grayling). The western Irish forms of both differ considerably from the English and European types, being in both cases larger and more brightly coloured. In the south of England the male *icarus* is small and of a rather dull lilac-blue, and the female is brown, slightly tinged with

blue, and with a border of red spots round all the wings. In this district the male is large and very bright blue, approaching the colour of *Lycæna adonis*, while the female is also blue, though not so bright, and the marginal red spots are very large and bright. Specimens of both forms may be seen in the Museum collection.

There is not much to be got on sandhills early in the year ; the real work begins with the flowering of the marram grass in June and July, and is better still when the ragweed is in flower in August. Great numbers of *Agrotidæ* and other *Noctuæ* frequent these flowers. A few come out about 4 P.M. on sunny days, and are then easily collected ; but for one that is out then a hundred are out after dark.

The heads of the *Senecio* are sometimes very large in such situations, and on a single flower-head I have counted fifty or sixty moths at once ; but they are very particular in their choice, and while one flower-head is nearly covered with moths, neighbouring and, as far as we can see, exactly similar heads are nearly deserted. Besides the moths there are plenty of earwigs, beetles, and gnats for any that are interested in these orders of insects. A few species are particularly abundant, viz.:—*Apamea didyma* in infinite variety, *Agrotis tritici* and *Noctua xanthographa*, also very variable. Five out of six moths belong to one or other of these species, but several others are also common—*Miana strigilis*, *M. bicoloria*, *M. literosa*, *Agrotis vestigialis*, *A. cursoria*, *A. nigricans*, *A. præcox*, *A. lucerneæ*, and *A. suffusa* ; *Noctua rubi*, *Triphæna ianthina*, and the common yellow underwings ; *Phlogophora meticulosa*, *Hydræcia lucens*, *H. micacea*, and a number of others. A few *Geometræ* come also to the flowers, besides a good many *Crambi* and other *Pyrallides*, and several species of *Depressaria*. On the heather and bracken of the older parts of the sandhills other species occur, but the only noticeable one is *Gnophos obscurata*, which is very abundant.

Micro-lepidoptera are abundant, and several good species occur, such as *Anerastia lotella*, *Crambus Warringtonellus*, *C.*

geniculeus, *Dictyopteryx Bergmanniana* amongst *Rosa spinosissima*, and many small *Gelechiæ*, which can be obtained by kicking them out of the roots of the bent, where they shelter during the day-time.

Insects are abundant in the woods of Donard demesne throughout the season. *Lycæna argiolus* (Holly Blue) is out in May and *Argynnis paphia* (Silver-washed Fritillary) in July, but the latter is scarce. No *Sphinges* seem to occur, and not many *Bombyces*, but *Hylophila prasinana* is common, also *Hepialus velleda*, *H. hectus*, and *Thyatira batis*. The latter comes to sugar along with various *Noctuæ*, such as *Acronycta rumicis*, *Hadena adusta*, and *Caradrina taraxaci*, and *Aphomia sociella*, whose larva feeds on the wax in bee-hives and the nests of wild bees.

The *Geometræ* are well represented, including several uncommon species, especially among the fir-feeding kinds. *Ellopiæ prosapiaria* is common, also *Bupalus piniaria* and *Boarmia repandata*, and the fine banded variety *conversaria*. *Venusia cambrica* and *Emmelesia teniata* are scarce. Several *Eupitheciæ* occur, including *E. satyrata*, *castigata*, *lariciata*, and *pumilata*. The last feeds on the flowers of *Ulex*, and swarms both in the higher parts of the demense and in the lower valleys. The pretty *Melanthia albicillata* may be seen settled on tree trunks in July. *Thera variata* is very abundant, but *T. firmata* is scarce. Micros are not very abundant, and only *Amblyptilia acanthodactyla* and *Olindia ulmana* are worth noting.

Collecting on the mountains themselves is rather disappointing, especially in the number of specimens obtained. I have sometimes walked several miles without seeing a specimen of any sort, and this on a fine day in summer. Nevertheless, a good many species occur, and I believe that a resident collector could do very good work when he had once found the right spots for insects.

This paucity of insects no doubt is due to the poverty of the flora of the Mourne range. There are no truly alpine insects recorded from the district, but then only Slieve Donard rises

appreciably over 2,400 feet, which is the lowest limit of alpine insects, and the upper part of this mountain is too bare and shelterless for Lepidoptera to exist there.

The most promising-looking parts for such insects are the actual tops of the few mountains which are crowned with rocks, like Bingian, Bearnagh, and Commedagh. Round these rocks the vegetation is luxuriant, and *Salix herbacea* grows freely. A few species occurring lower down may be mentioned. *Saturnia pavonia* is common, and its larva, together with that of *Dicranura vinula* and *Pygæra pigra*, is common on willow bushes by the streams. *Hadena contigua* occurs, *Anarta myrtilli* is common, also *Stilbia anomola*, *Pachnobia rubricosa* and *Phytometra viridaria*. The *Geometræ* include *Gnophos obscurata*, *Pseudoterpna pruinata*, *Scodiona belgiaria*, *Larentia cæsiata*, *Eupithecia nanata*, *E. minutata* and *E. sobrinata*—this last feeding on juniper. A few micros may be mentioned:—*Phycis fusca* occurs in the Happy Valley and also above Donard demesne, *Mixodia Schulziana* is pretty common, and *Pamplusia mercuriana* occurs at the top of Slieve Bingian.

No doubt further search would result in many additions to this rather meagre list, but there is so large an extent of country to be covered that for anyone living at a distance it would take many years to make anything approaching a complete list of the lepidoptera of the Mourne.

In conclusion, I may say that specimens of nearly all the species mentioned are now in the Belfast Museum collection, and that it is much to be hoped that some member of the Club will take up this branch of field work and add to our knowledge of our local Lepidoptera.

LIST OF SPECIES.

RHOPALOCERA.

Pieris brassicæ—Common.

rapæ—Common.

napi—Common. Occurs in the marshes on the Belfast hills up to 900 feet. The specimens are generally strongly marked on upper side, and the under side is sometimes very yellow.

Euchloë cardamines—Common. I have specimens from the Belfast hills expanding only 30 mm.

Argynnis paphia—Donard demesne and other woods, but not common.

Vanessa urticæ—Common.

atalanta—Not common generally, but very abundant in 1893.

cardui—Common in some years.

Pararge egeria—Very abundant in all woods and lanes, from May to October.

megæra—Local; Islandmagee, Newcastle, &c.

Satyrus semele—Very abundant on sandhills, Newcastle, &c.; the

specimens are large and brightly coloured.

Epinephele janira—Common. Large and well marked; females, with *bipupilled ocellus* and extra *ocelli*, sometimes occur.

hyperanthus—Common.

Cœnonympha pamphilus—Common.

Polyommatus phlæas—Common.

Lycæna icarus—Common. Large; males often very bright blue; females also very blue, with the marginal red spots strongly developed, and occasionally the discoidal spots on both wings are white-ringed.

argiolus—Donard demesne; common.

minima—Antrim coast. Very abundant on Islandmagee; male often bluer than type, and some times showing the discoidal spots as in *L. argiolus*.

[None of the *Hesperidæ* are recorded from this district.]

SPHINGES.

Acherontia atropos—Lisburn, &c.; scarce.

Delliphila livornica—Two specimens taken at rhododendron flowers in Ormeau Park, Belfast, June, 1888.

Chærocampa elpenor—Larvæ

occasionally on *Epilobium hirsutum* about Belfast.

Smerinthus populi—Common.

Macroglossa stellatarum—Scarce.

bombyliformis—Common on Belfast hills.

Zygæna filipendulæ—Common.

BOMBYCES.

Hylophila prasinana—Common.

Nudaria mundana—Newcastle, &c.; scarce.

Muchellia jacobææ—Common.

Nemeophila plantaginis—Islandmagee, very abundant; Belfast hills.

Arctia caja—Common.

Spilosoma fuliginosa—Common.
mendica—Common; males apparently always cream-coloured.
lubricipeda—Common.
menthastri—Very abundant; some specimens nearly immaculate, and ochreous specimens (var. *ochracea*) are common, sometimes with the wing-rays white.
Hepialus humuli—Very abundant.
velleda—Very abundant; var. *gallicus* also common.
hectus—Common.
Orgyia antiqua—Larvæ scarce.
Bombyx rubi—Larvæ common on hills.
querus, var. *callunæ*—Larvæ common.

Saturnia pavonia—Very common on hills.
Dicranura vinula—Common.
Lophopteryx camellina—Common.
Notodonta dictæa—Scarce.
dromedarius—Scarce, Belfast.
ziczac—Larvæ not uncommon on Willow.
Phalæra bucephala—Common.
Pygæra pigra—Larvæ on willow, Mourne Mountains.
Thyatira derasa—Collin Glen; common.
batis—Very common.

NOCTUÆ.

Bryophila perla—Newcastle.
Aconycta psi—Common.
rumicis—Donard demesne; a pale form.
Leucania conigera—Belfast marshes.
lithargyria—Common.
comma—Common.
impura—Very abundant.
pallens—Very abundant; var. *rufescens* common.
Tapinostola fulva—Very abundant in marshes near Belfast; varies from pale bone-colour to dark reddish.
Nonagria arundinis—Local in Co. Down.
Hydræcia nictitans—Most, if not all, the specimens from this district are referable to *H. lucens*.
micacea—Common.
Xylophasia rurea—Very abundant; var. *combusta* also common.
lithoxylea—Very abundant.
monoglypha—Very abundant; var. *brunnea* (Tutt) is common and var. *obscura* (Tutt) scarce.
Neuronia popularis—Belfast.
Charæas graminis—Very abundant.
Luperina testacea—Belfast; common.
Mamestra brassicæ—Common.
Apamea basillinea—Common.

Apamea ophiogramma—One specimen in a marsh near Belfast.
gemina—Common.
leucostigma—The type and var. *fibrosa* are both common in the marshes about Belfast and elsewhere in the district.
didyma—Very abundant.
Miana strigilis—The type is scarce, but the darker varieties fairly common.
fasciuncula—Common; small grey specimens occur on the hills in August.
litterosa—Not common, but generally distributed.
bicoloria—Very abundant; var. *rufuncula* is not uncommon.
Celæna Haworthii—Common on Belfast hills.
Grammesia trigrammica—Common.
Stilbia anomala—Common in one place on Black Mountain, Belfast; also occurs in the Mourne Mountains. The specimens are large and dark.
Caradrina taraxaci—Common.
4-punctata—Very abundant; the specimens from this district are generally either ochreous or dark grey.
Rusina tenebrosa—Belfast scarce.

Agrotis vestigialis—Sand-hills, Dundrum; abundant.
segetum—Common.
exclamationis—Common.
cursoria—Sand-hills; common.
nigricans—Common.
tritici—Sand-hills; very abundant; mostly reddish brown.
strigula—Belfast hills, abundant.
præcox—Sand-hills, common.
lucerneæ—Sand-hills at Dundrum; dark grey.
Noctua glareosa—Belfast hills, abundant.
augur—Common.
plecta—Common.
c-nigrum—Common.
brunnea—Common.
festiva—Common.
umbrosa—Very abundant.
rubi—Common.
baja—Common.
Triphæna ianthina—Common.
comes—Common.
pronuba—Common.
Amphipyra tragopogonis—Common.
Mania typica—Common.
maura—Common.
Tenlocampa gothica—Very abundant at willows in spring.
incerta—Very abundant, but not very variable, most of the specimens being dark brown.
opima—Belfast; both the pale type and var. *brunnea* (Tutt).
stabilis—Very abundant.
Orthosia lota—Belfast, common.
Cerastis vacciniæ—Common at ivy-bloom.
spadicea—Common at ivy-bloom.
Scopelosoma satellitia—Common at ivy-bloom.
Xanthia fulvago—Belfast, scarce.
circellaris—Belfast, scarce.
Cirrhædia xerampelina—Belfast and Castlewellan.

Calymnia trapezina—Common.
Dianthæcia nana—Common in marshes.
capsincola—Common.
cucubali—Common.
Pollia ohi—Glenarm.
Misella oxyacanthæ—Common.
Agriopsis aprilina—Common.
Euplexia lucipara—Common.
Aplecta nebulosa—Common.
Hadena adusta—Donard demesne and Black Mountain; common.
glauca—Belfast hills, common. The specimens belong to var. *lappo* (Dup.)
dentina—Common.
trifolii—Common.
oleraceæ—Common.
pisi—Scarce.
contigua—Mourne Mountains, scarce.
Calocampa exoleta—Belfast, &c.; common.
vetusta—Belfast, &c.; common.
Cucullia umbratica—Donard demesne, scarce.
Gonoptera libatrix—Common.
Habrostola tripartita—Common.
triplasia—Common.
Plusia chrysis—Common.
festuæ—Common.
pulchrina—Common.
gamma—Common.
Anarta myrtili—Mourne Mountains, common.
Phytometra viridaria—Mourne Mountains and Belfast hills; common.
Rivula sericealis—Common.
Zanclognatha grisealis—Common.
tarsipennalis—Common.
Pechypogon barbalis—Common.
Hypena proboscidalis—Very abundant.

GEOMETRÆ.

Ourapteryx sambucata—Belfast.
Epione apiciaria—Belfast, scarce.
Rumia luteolata—Very abundant.
Metrocampa margaritaria—Common.

Ellopia fasciaria—Donard demesne, common.
Selenia bilunaria—Common.
Odontopera bidentata—Common.
Crocallis elinguaris—Common.

- Ennomos quercinaria** — Tollymore Park, &c.
- Phigalia pendaria** — Common; large and pale coloured.
- Nyssia zonaria** — Ballycastle, very abundant.
- Amphidasys betularia** — Common.
- Boarmia repandata** — Common; rather dark; var. *conversaria*, Donard demesne, scarce
- gemmaria** — Common.
- Tephrosia crepuscularia** — Donard demesne, common; dark varieties frequently occur.
- Gnophos obscurata** — Newcastle, abundant; very dark.
- Pseudoterpna pruinata** — Common.
- Venusia cambrica** — Donard demesne, scarce.
- Acidalia didimiata** — Common.
- bisetata** — Common.
- marginipunctata** — Kilkeel, scarce.
- aversata** — Common; var. *spoliata*, common.
- Cabera pusaria** — Very abundant; the specimens from this district are rather more sprinkled with black scales than is the case with English specimens.
- exanthemaria** — Very abundant.
- Macaria liturata** — Donard demesne.
- Strenia clathrata** — Common; the yellow parts of the wings pale, inclining to white.
- Scodiona belgiaria** — Mourne Mountains.
- Ematurga atomaria** — Hills, abundant.
- Bupalus pinularia** — Donard demesne, very abundant.
- Abraxas grossulariata** — Common.
- Lomaspilis marginata** — Common.
- Hybernica rupicaprarum** — Common.
- marginaria** — Common; dusky, ill-marked specimens are frequent.
- defoliaria** — Common.
- Cheimatobia brumata** — Common.
- Oparabia dilutata** — Common.
- filigrammaria** — Belfast hills.
- Larentia didymata** — Very abundant.
- multistrigaria** — Common, generally of an ochreous tint.
- cæsiata** — Belfast hills, abundant; Mourne Mountains, scarce.
- salicata** — Belfast hills, common.
- olivata** — Glenariffe.
- viridaria** — Common.
- Emmelesia alchemillata** — Bryansford.
- albulata** — Common; dark and well marked.
- decolorata** — Belfast, locally abundant.
- tæniata** — Donard demesne, very rare.
- Eupithecia oblongata** — Common.
- satyrata** — Common; var. *callunaria*, very abundant on hills; very variable, some specimens approaching v. *Curzoni*.
- castigata** — Common; occasional melanic specimens occur.
- indigata** — Belfast.
- constrictata** — Islandmagee, common; Kilkeel.
- nanata** — Common on hills.
- vulgata** — Common.
- absynthiata** — Common.
- minutata** — Common.
- assimilata** — Common.
- lariciata** — Collin Glen; Larne, very abundant.
- abbreviata** — Scarce.
- sobrinata** — Belfast, and Mourne Mountains, scarce.
- pumilata** — Common; very abundant on Mourne Mountains.
- Thera variata** — Common.
- firmata** — Donard demesne, scarce.
- Hypsipetes trifasciata** — Common; very abundant in Collin Glen.
- sordidata** — Common.
- Melanthia bicolorata** — Glenarm, Collin Glen, &c., not common.
- ocellata** — Collin Glen, &c.
- albicillata** — Donard demesne, common.
- Melanippe tristata** — Knockagh, abundant; Mourne Mountains.
- sociata** — Common.
- montanata** — Very abundant.

- gallata*—Local, not common.
fluctuata—Common.
Anticlea badiata—Very abundant.
nigrofasciaria—Collin Glen, scarce.
Coremia munitata—Local, scarce.
designata—Scarce.
ferrugata—Common.
unidentaria—Common.
Campptogramma bilineata—Very abundant.
Phibalapteryx lapidata—Belfast Hills.
vittata—Belfast marshes, very abundant.

- Cidaria miata*—Common.
truncata—Common, mostly var. *perfuscata*.
immanata—Common.
saffumata—Common.
silaceata—Collin Glen, common.
testata—Hills, common.
populata—Common.
fulvata—Common.
Pelurga comitata—Common.
Eubolia limitata—Very abundant.
plumbaria—Very abundant.
Anatis plagiata—Black Mountain, common.

PYRALIDES.

- Pyralis glaucinalis*—Common.
farinalis—Common.
Scoparia ambigua—Scarce.
cembrae—Belfast, common.
dubitalis—Common.
ingratella—Knockagh, common.
truncicolella—Donard demesne.
augustea—Dundrum.
Nomophila noctuella—Common.
Herbula cespitalis—Common.
Ennychia cingulata—Knockagh, common.
Burrhypara urticata—Common.
Scopula lutealis—Very abundant.
olivalis—Common.
prunalis—Collin Glen, &c.
ferrugalis—Islandmagee, scarce.
Botys fuscalis—Common.
Ebulea sambucalis—Common.
Pionea forficalis—Common.
Cataclysta lemnata—Common.
Hydrocampa stagnata—Common.
Chrysocorys festaliella—Belfast.
Platyptilia ochrodactyla—Dunnaneile Island, Strangford Lough.
isodactyla—Belfast Hills, scarce.
gonodactyla—Common.

- Amblyptilia acanthodactyla*—Newcastle and Belfast, scarce.
Oxyptilus parvidactyla—Knockagh, abundant.
Mimeseoptilus bipunctidactylus—Black Hill, &c., abundant.
pterodactylus—Black Hill, abundant.
Pterophorus monodactylus—Common.
Acipitilia tetradactyla—Islandmagee, scarce.
Chilo phragmitellus—Black Mountain, scarce.
Crambus pratellus—Common.
perlellus—Common.
warringtonellus—Sandhills, common.
geniculeus—Sandhills, common.
culmellus—Very abundant.
tristellus—Common.
hortuellus—Common.
Homeosoma senecionis—Newcastle, scarce.
Phycis fusca—Mourne Mountains.
subornatella—Islandmagee, rare.
Aphomia sociella—Common.

TORTRICES.

- Tortrix crataegana*—Common.
xylosteara—Scarce.
rosana—Scarce.
diversana—Common.

- unifasciana*—Belfast Hills, &c., common.
costana—Common.
viurnana—Hills, common.

- palleana**—Black Hill, &c., common.
viridana—Common.
Peronea Schalleriana—Islandmagee.
variegana—Common.
hastiana—Belfast, scarce.
caledoniensis—Hills, common.
Teras contaminana—Common.
Dictyopteryx Lœfingiana—Common.
Holmiana—Belfast, scarce.
Bergmanniana—Very abundant.
Argyrotoxa Conwayana—Common.
Penthina sauciana—Common.
gentiana—Common.
Antithesia salicella—Belfast, scarce.
Hedya ocellana—Common.
Spilonota trimaculana—Common.
Pardia tripunctana—Common.
Sericoris littoralis—Islandmagee.
cespitana—Common.
lacunana—Very abundant.
Mixodia Schulziana—Hills, common.
Orthotœnia antiquana—Belfast.
Cnephasia politana—Donard demesne, &c., common.
musculana—Common.
Sciaphila virgaureana—Common.
chrysanthæana—Common.
octomaculana—Rare.
Sphaleroptera ictericana—Scarce.
Clepsia rusticana—Common.
Bactra lanceolana—Very abundant.
Phoxopteryx myrtillana—Belfast Hills, scarce.
lundana—Very abundant.
Grapholitha nigromaculana—Mourne Mountains.
subocellana—Very abundant.
trimaculana—Belfast.
Penkleriana—Common.
nævana—Common.
Batodes angustiorana—Belfast.
Pædisca bilunana—Belfast, scarce.
corticana—Belfast, common.
Ephippiphora cirsiiana—Common.
brunnicheana—Common.
Olindia ulmana—Donard demesne, scarce.
Pamplusia mercuriana—At top of Slieve Bingham (2400 feet).
Stigmonota perlepidana—Collin Glen, abundant.
Dicrorampha plumbana—Knockagh, abundant.
Catoptria ulicetana—Very abundant.
hypericana—Belfast Hills.
cana—Belfast Hills.
citrana—Belfast, scarce.
Simæthis oxyacanthella—Very abundant.
Eupæcilia dubitana—Belfast, scarce.
atricapitana—Belfast, scarce.
angustana—Common.
griseana—Scarce.
ciliella—Hills, common.
Xanthosetia zœgana—Common.
hamana—Common.
Argyrolepis Hartmanniana—Belfast Hills, local.
Conchylis straminea—Islandmagee.
Aphelia osseana—Common.

TINEÆ.

- Diurnea fagella**—Common; always ochreous.
Scardia cloacella—Common.
Blabophanes rusticella—Common.
Tinea pellionella—Common.
pallescentella—Common.
lapella—Common.
merdella—Common.
Lampronia luzella—Belfast, scarce.
Nemophora Schwarziella—Common.
Swammerdamia cæsiella—Very abundant.
pyrella—Common.
spiniella—Common.

Hyponomeuta padellus—
Common.

cagnagellus—Locally common.

Prays curtisellus—Common.

Plutella cruciferarum—Common.

Cerostoma radiatella—Common.
costella—Common.

Harpiteryx xylostella—
Common.

Phibalocera quercana—Common.

Depressaria costosa—Very abundant

pallarella—Scarce.

umbellana—Newcastle, scarce.

arenella—Common.

liturella—Common.

yeatiana—Common.

ap plana—Common.

heracleana—Common.

Gelechia ericetella—Common.

Bryotropha terella—Belfast.

desertella—Newcastle sand-hills.

politella—Belfast.

Lita artemisiella—Newcastle
sand-hills.

marmorea—Newcastle sand-hills,
very abundant.

Teleia vulgella—Scarce.

dodecella—Belfast Hills, scarce.

Cherlaria Hubnerella—Belfast.

Pleurota bicostella—Hills, com-
mon.

Ecophora pseudospretella—
Common.

Endrosis fenestrella—Common.

Glyphipteryx thrasonella—Very
abundant in marshes.

Haworthana—Belfast, scarce.

equitella—Islandmagee, abun-
dant.

Fischeriella—Common.

Argyresthesia ephippella—
Belfast.

nitidella—Common.

semitestacella—Belfast, scarce.

albistria—Belfast, common.

conjugella—Common.

mendica—Common.

pygmæella—Scarce.

Gracilaria tringipennella—
Islandmagee, scarce.

syringella—Common.

Ornix anglicella—Belfast.

betulæ—Belfast.

Coleophora albicosta—Belfast.

cæspititiella—Common.

Chauliodes chærophylellus—
Belfast.

Laverna atra—Belfast.

Elachista monticola—Ballyna-
hinch.

perplexella—Common.

obscurella—Common.

rhynchosporella—Belfast,
scarce.

rufocinerea—Belfast, scarce.

subalbidella—Very abundant.

argenteila—Very abundant.

Lithocolletis pomifoliella—
Belfast.

salicicolella—Belfast.

quercifoliella—Belfast, common.

alnifoliella—Belfast.

A
SUPPLEMENT
TO THE
FLORA
OF THE
NORTH-EAST OF IRELAND
OF
STEWART AND CORRY.

BY
S. A. STEWART, F.B.S. EDIN.,
AND
R. LLOYD PRAEGER, B.E.

BEING AN APPENDIX (No. 5 OF VOL. 2) TO THE PROCEEDINGS
OF THE
BELFAST NATURALISTS' FIELD CLUB
FOR 1894-95.

NOTE.

The size of the page in the following paper has been made the same as that of "*Flora of the North-East of Ireland*," in order that the Supplement may be bound with the Work by those who desire it.

A SUPPLEMENT

TO THE

"FLORA OF THE NORTH-EAST OF IRELAND"

OF STEWART AND CORRY.

By S. A. STEWART, F.B.S. EDIN., AND R. LLOYD PRAEGER, B.E.

IT is now within a few months of seven years since the *Flora of the North-East of Ireland* was published, affording botanists a summary of our knowledge of local topographical botany, and giving a general account of the flora of the twelfth district of *Cybele Hibernica*. Since that time, considerable progress has been made; a goodly number of species have been added to the flora, and our knowledge of the distribution of others has been augmented to a noteworthy degree. Since the publication of *Flora* several papers have appeared summarizing the more important additions, and others dealing with the botanical characteristics of certain tracts of country, or with certain groups of plants within our district. There have also appeared scattered notes on the local flora in Journals, and Proceedings of Societies. Our present object has been to bring all these together, along with a considerable amount of unpublished material, and no pains have been spared to make this Supplement complete and trustworthy, by inviting the assistance of local botanists, by examining herbaria, and published and unpublished matter not accessible formerly, and by carrying out systematic field work in selected districts, and searches for plants whose local status required investigation.

Being a Supplement to the *Flora of the North-East of Ireland*, the present paper divides itself into two sections:—(1) Plants or records to be removed from the *Flora*; and (2) plants or records to be added to the *Flora*. The former category, we are glad to say, is soon disposed of. The following species must be withdrawn from the list of native and naturalized plants, for the reasons stated in the systematic list that follows:—

Ononis spinosa.
Rosa micrantha.
Silene pratensis.

Calamintha officinalis.
Primula veris.

A few varieties have also to be withdrawn, and a few records require to be transferred to plants different from those under which they were published; these corrections are made in their proper place.

There are a number of other plants for which no recent record could be given in *Flora*, and for the presence of which in the district now we cannot vouch, although many of them have been specially sought for, for the purpose of this Supplement; and there are a few others which recent changes have driven from former haunts. The refinding of these plants is much to be desired, so we draw attention here to the more prominent of them. They may be subdivided as follows:—

- (1) Plants of which we have reason to doubt the identification:—

Leontodon hispidum. *Gentiana amarella.*

- (2) Plants which appear to have been not established in the district, and now missing:—

Sisymbrium sophia. *Solanum nigrum.*
Sinapis nigra. *Chenopodium rubrum.*

- (3) Plants apparently destroyed through drainage: these are mostly plants of Lough Neagh basin:—

Rhamnus catharticus. *Carex elongata.*
Lathyrus palustris. *C. filiformis.*
Sium latifolium. *C. paludosa.*
Epipactis palustris. *Lastrea thelypteris.*
Cephalanthera ensifolia. *Pilularia globulifera.*

- (4) Plants apparently lost though building or cultivation:—

Eleocharis uniglumis. *Hordeum pratense.*
Schlerochloa procumbens.

Three other plants:—*Hypericum hirsutum*, *Adora moschatellina*, *Carex muricata*, have become almost extinct owing to similar causes.

- (5) Plants not seen recently, but for whose absence no special reason exists:—

Geranium sanguineum. *Taxus baccata.*
Trifolium striatum. *Calamagrostis epigejos.*
Pyrus aria. *Poa nemoralis.*
Arctostaphylos uva-ursi. *Polypodium dryopteris.*
Pyrola secunda. *Tolypella nidifica.*

We trust that our drawing attention to the above may lead to the rediscovery of some of them.

Turning now to the second part of our work—additions to the *Flora*—we find a considerable amount of new matter available, thanks to the diligence of a number of northern botanists. The chief systematic investigations carried out in our district since the publication of *Flora* have been the exploration of the Mourne Mountains district for cryptogams by Mr. Lett, and for phanerogams by the present writers; and the examination of the valley of the Lower Bann by Mrs. Leebody, Miss Knowles, and R. Ll. P. The subjoined list shows the various sources from which the material of the present Supplement has been drawn.

SOURCES OF INFORMATION.

BOOKS—

English Botany ; Supplement to Vols. I—IV. By N. E. Brown. 1892.

The British Moss Flora, by Dr. Braithwaite, Vols. I. and II., 1880-95.

PERIODICALS—

Journal of Botany, 1888 to date. Contains some notes concerning the local flora.

Irish Naturalist, 1892 to date. Papers and notes, the more important papers being :—

Stewart, S. A.—Notes on the Flora of the North-East of Ireland, 1894.

Shoolbred, W. A.—A Botanical Trip to Co. Antrim, 1894.

Groves, H. & J.—The Distribution of the Characeæ in Ireland, 1895.

PROCEEDINGS OF SOCIETIES—

Royal Irish Academy. The papers consulted are :—

Hart, H. C.—Plants of some of the Mountain Ranges of Ireland, 1884. This paper yielded some notes additional to those already extracted from it.

Lett, Rev. H. W.—Report on the Mosses, Hepatics, and Lichens of the Mourne Mountain district, 1890.

Hart, H. C.—Range of Flowering Plants and Ferns on the Mountains of Ireland, 1891. Yields very little additional to the former paper.

Stewart, S. A., and R. Lloyd Praeger —Botany of the Mourne Mountains, 1892. Our increased knowledge of the Co. Down flora is mainly due to this paper, and that by Rev. Mr. Lett.

Belfast Naturalists' Field Club, 1888-9 till 1894-5. Papers and notes, including plants found on the Excursions.

Praeger.—New or Rare North of Ireland Plants, 1891.

Do. —Local Botanical Notes, 1891 and 1892 ; 1893.

Botanical Exchange Club Reports, 1888 till 1894.

Watson Botanical Exchange Club Reports, 1885—6 till 1893—4.

MS. NOTES AND LISTS—

Templeton, John. Four volumes of his MS. "Flora Hibernica," at present deposited with the Belfast Nat. Hist. and Phil. Society. Contains much original matter concerning local cryptogams, which could not be worked out in time for the present paper.

Brown, Robert. We are indebted to Mr. James Britten for a transcript of local notes contained in the two volumes of MS. in British Museum, mentioned in his review of *Flora N.E. Ireland* in *Journ. Bot.* 1888.

Leebody, Mrs.

Knowles, Miss M. C.

Lett, Rev. H. W.

Waddell, Rev. C. H.

Brenan, Rev. S. A.

Smith, Rev. W. S.

Davies, J. H.

} Notes referring to various districts, kindly supported by specimens when requested.

To several other observers we are indebted for occasional notes of plants observed by them in new stations, and for specimens sent.

HERBARIA—

Moore, David. The greater portion of the original and duplicate sets representing the flora of Co. Antrim, and of the duplicate set representing the flora of Co. Derry, made by Dr. Moore in 1836 and 1837, when in the Ordnance Survey service, are deposited in the Dublin Science and Art Museum. The duplicate set is unfortunately not localized.

Trinity College, Dublin. The British Herbarium, which includes the northern collection of Rev. W. M. Hind, was looked into, but yielded nothing of importance for our purpose.

Glasnevin Botanic Garden. The British Herbarium contains some of Dr. Moore's northern plants, but too little was found to induce a thorough examination of the collection.

Grainger, Rev. Canon. A small collection, made chiefly in Antrim, which yielded a few notes.

The addition of our own MS. notes to this list completes the enumeration.

The notes now brought together include a number of important additions to the flora of the north-eastern province. In the lists of additions which follow, the members of two critical genera—*Rubus* and *Hieracium*—figure largely. While the value of the multitudinous "species" into which these genera are now divided must not be over-estimated, it is none the less important that the distribution of the various forms should be accurately worked out, and in this respect our district is now behind no other in Ireland. Some interesting species have been added, such as *Carex pauciflora* (a good addition to the Irish flora), *Polygonum maculatum* and *Sparganium neglectum*, of which we are not aware of any previous record from Ireland, *Spiranthes Romanzoviana* (in Europe known only in two other Irish counties), *Ranunculus circinatus*, *Drosera intermedia*, *Saussurea alpina*, *Orehis pyramidalis*, *Carex aquatilis*. The following lists show the additions to the Phanerogams and higher Cryptogams of District 12 and to each of the three counties that compose it, the Mosses and Hypnites being treated separately on a subsequent page.

ADDITIONS TO DISTRICT 12.

<i>Ranunculus circinatus.</i>	<i>Saussurea alpina.</i>
<i>Drosera intermedia.</i>	<i>Hieracium Leyi.</i>
<i>Trifolium hybridum.</i>	<i>Farrense.</i>
<i>Poterium sanguisorba.</i>	<i>rubicundum.</i>
<i>Rubus Rogersii.</i>	<i>argenteum.</i>
<i>nitidus.</i>	<i>Sommerfeltii.</i>
<i>gratus.</i>	<i>hibernicum.</i>
<i>erythrinus.</i>	<i>stenolepis.</i>
<i>Lindleyanus.</i>	<i>euprepes.</i>
<i>pulcherrimus.</i>	<i>sciaphilum.</i>
<i>silvaticus.</i>	<i>auratum.</i>
<i>micans.</i>	<i>Polygonum maculatum.</i>
<i>Leyanus.</i>	<i>Orchis pyramidalis.</i>
<i>echinatus.</i>	<i>Spiranthes Romanzoviana.</i>
<i>rudis.</i>	<i>Sparganium neglectum.</i>
<i>scaber.</i>	<i>Potamogeton undulatus.</i>
<i>fuscus.</i>	<i>Carex pauciflora.</i>
<i>rosaceus.</i>	<i>aquatilis.</i>
<i>hirtus.</i>	<i>filiformis.</i>
<i>chamæmorus.</i>	<i>Triticum acutum.</i>
<i>Rosa glauca.</i>	<i>Chara contraria.</i>
<i>Arctium minus.</i>	

ADDITIONS TO COUNTY DOWN.

<i>Ranunculus circinatus.</i>	<i>Epilobium angustifolium.</i>
<i>Lepidium campestre.</i>	<i>Saxifraga tridactylites.</i>
<i>Drosera intermedia.</i>	<i>Inula helenium.</i>
<i>Sagina ciliata.</i>	<i>Saussurea alpina.</i>
<i>Spergularia rubra.</i>	<i>Hieracium argenteum.</i>
<i>Hypericum quadrangulum.</i>	<i>hibernicum.</i>
<i>Trifolium hybridum.</i>	<i>sciaphilum.</i>
<i>Rubus suberectus.</i>	<i>gothicum.</i>
<i>plicatus.</i>	<i>auratum.</i>
<i>Rogersii.</i>	<i>Galeopsis speciosa.</i>
<i>nitidus.</i>	<i>Polygonum maculatum.</i>
<i>Lindleyanus.</i>	<i>Salix purpurea.</i>
<i>pulcherrimus.</i>	<i>Populus tremula.</i>
<i>silvaticus.</i>	<i>Sparganium neglectum.</i>
<i>mucronatus.</i>	<i>Potamogeton Zizii.</i>
<i>Leyanus.</i>	<i>Ruppia rostellata.</i>
<i>rudis.</i>	<i>Eleocharis acicularis.</i>
<i>scaber.</i>	<i>Carex Ederi.</i>
<i>fuscus.</i>	<i>Bromus racemosus.</i>
<i>rosaceus.</i>	<i>Triticum acutum.</i>
<i>hirtus.</i>	<i>Chara contraria.</i>
<i>Rosa involuta.</i>	

ADDITIONS TO COUNTY ANTRIM.

<i>Arabis hirsuta.</i>	<i>Hieracium stenolepis.</i>
<i>Geranium perenne.</i>	<i>euprepes.</i>
<i>Trifolium hybridum.</i>	<i>auratum.</i>
<i>Poterium sanguisorba.</i>	<i>Vaccinium oxycoccos.</i>
<i>Rubus gratus.</i>	<i>Utricularia intermedia.</i>
<i>Lindleyanus.</i>	<i>Callitriche autumnalis.</i>
<i>pulcherrimus.</i>	<i>Orchis pyramidalis.</i>
<i>echinatus.</i>	<i>Juncus maritimus.</i>
<i>rosaceus.</i>	<i>Potamogeton undulatus.</i>
<i>Rosa glauca.</i>	<i>Carex pauciflora.</i>
<i>Arctium minus.</i>	<i>aquatilis.</i>
<i>Hieracium flocculosum.</i>	<i>filiformis.</i>
<i>Farrense.</i>	<i>Schlerochloa rigida.</i>
<i>rubicundum.</i>	<i>Triticum acutum.</i>

ADDITIONS TO COUNTY DERRY.

<i>Papaver rhæas.</i>	<i>Hieracium stenolepis.</i>
<i>Meconopsis cambrica.</i>	<i>euprepes.</i>
<i>Viola canina.</i>	<i>Myosotis collina.</i>
<i>Sagina apetala.</i>	<i>Veronica polita.</i>
<i>Spergularia salina.</i>	<i>Beta maritima.</i>
<i>Ononis arvensis.</i>	<i>Atriplex erecta.</i>
<i>Trifolium hybridum.</i>	<i>Orchis pyramidalis.</i>
<i>Rubus rhamnifolius.</i>	<i>Spiranthes Romanzoviana.</i>
<i>gratus.</i>	<i>Carex teretiuscula.</i>
<i>pulcherrimus.</i>	<i>stricta.</i>
<i>Lindleyanus.</i>	<i>paludosa.</i>
<i>erythrinus.</i>	<i>riparia.</i>
<i>micans.</i>	<i>Trisetum flavescens.</i>
<i>chamæmorus.</i>	<i>Ceterach officinarum.</i>
<i>Myriophyllum spicatum.</i>	<i>Chara aspera.</i>
<i>Galium mollugo.</i>	<i>contraria.</i>
<i>Hieracium Leyi.</i>	<i>vulgaris.</i>
<i>Sommerfeltii.</i>	<i>Nitella translucens.</i>

As it must ever be, there has been in some cases doubt as to what plants, originally introduced, must now be included in the flora as thoroughly naturalized, and which may be considered as not permanently established. Time alone can settle these points, and we have preferred to err on the side of severity rather than of leniency as regards admissions to the flora on the plea of naturalization. The number of foreign plants introduced into the country is increasing, along with the increased imports of foreign grain and seed, and no doubt some of the hardy continental species thus introduced have obtained, or will obtain, a permanent footing in the island. The following extraordinary list of imported

plants, collected by Mr. Richard Hanna in 1893 and 1894 in waste ground adjoining the Belfast Distillery, and near Hughes' Flour Mill, will convey an idea of the number of aliens that are now-a-days showered down on our country :

<i>Ranunculus muricatus.</i>	<i>T. latipaceum.</i>
<i>Sisymbrium repandum.</i>	<i>Trigonella cœrulea ?</i>
<i>S. pannonicum.</i>	<i>Lonicera caprifolium.</i>
<i>S. columnæ.</i>	<i>Valerianella dentata.</i>
<i>S. sophia.</i>	<i>Anthemis cotula.</i>
<i>S. thalianum.</i>	<i>Hemizonia sp.</i>
<i>Lepidium draba.</i>	<i>Serratula tinctoria.</i>
<i>L. campestre.</i>	<i>Centaurea solstitialis.</i>
<i>L. perfoliatum.</i>	<i>Carduus crispus.</i>
<i>Camelina sativa.</i>	<i>Solanum nigrum.</i>
<i>Reseda lutea.</i>	<i>Echium vulgare.</i>
<i>R. suffruticulosa.</i>	<i>Amsinckia lycopsoides.</i>
<i>Saponaria baccaria.</i>	<i>Salvia verticillata.</i>
<i>Silene inflata.</i>	<i>Stachys annua.</i>
<i>S. dichotoma.</i>	<i>Marrubium vulgare.</i>
<i>Lychnis vespertina.</i>	<i>Plantago arenaria.</i>
<i>Geranium phæum.</i>	<i>Rumex palustris.</i>
<i>G. pratense.</i>	<i>Hemerocallis flava.</i>
<i>Melilotus arvensis.</i>	<i>Setaria viridis.</i>
<i>M. parviflora.</i>	<i>Ægilops ovata ?</i>
<i>Medicago denticulata.</i>	<i>Æ. caudata.</i>
<i>M. falcata ?</i>	<i>Echinochloa crus-galli.</i>
<i>Trifolium arvense.</i>	<i>Bromus tectorum.</i>
<i>T. resupinatum.</i>	

The plants were introduced with foreign grain. Australian, Indian, Russian, and American. A smaller group found by Mrs White-Spunner at Greenisland, whither they came with food for fowls, is given by R. Ll. P. in *Irish Naturalist* for 1893.

<i>Sisymbrium sophia.</i>	<i>Melilotus alba.</i>
<i>Thlaspi arvense.</i>	<i>Cichorium intybus.</i>
<i>Erysimum orientale.</i>	<i>Hyoscyamus niger.</i>
<i>Lychnis vespertina.</i>	<i>Linaria sp.</i>
<i>Linum perenne.</i>	<i>Galeopsis speciosa.</i>

Other similar lists might be quoted, but the above will serve as examples.

During the interval since the publication of the *Flora* much has been done to extend our knowledge of the *Musci* and *Hepaticæ* of the district. The workers, indeed, have been few, our notes being derived mainly from Rev. H. W. Lett and Rev. C. H. Waddell, to whose zeal and powers of observation we are indebted for by far the larger portion of the information summarised in the following pages.

In 1888 the number of species of mosses known to grow in north-east Ireland

stood at 293, and the hepatics, or scale-mosses, at 73. The present enumeration brings the former up to 301, and the latter to 84. Almost a moiety of the mosses known to occur in the British Islands, and more than a moiety of the scale-mosses, are still *desiderata* for our district. That in the future our lists will be added to cannot be doubted, especially in the minute and critical species. The publication of Dr. Braithwaite's splendid "British Moss Flora" has been a stimulus to present workers, and its completion cannot fail to stimulate and facilitate future researches. A similar Monograph of British *Hepaticæ* would be a boon. That this interesting group of plants is still imperfectly known to us is largely due to the want of such help. The publishing of additional species is, however, the smaller portion of the labour of the local botanist. A great amount of work has been done, and much remains to be done, in extending our knowledge of the range and frequency of the plants already on record.

These lists might have been larger had a laxer method of compilation been adopted. Many notes have been held over where satisfactory specimens were not forthcoming, and doubtless some of these excluded records will prove correct hereafter. As regards the few notes of Antrim mosses by Mr. Dixon, they stand on the sufficient authority of that gentleman alone. Extracted from the Templeton MSS. we print at the end a number of localities for hepatics not included in the authenticated list. Many of these are believed to be reliable, while some are manifestly incorrect. No specimens are extant wherewith to test these notes, and their confirmation or otherwise remains for the future.

ADDITIONS TO DISTRICT 12.

<i>Anisothecium crispum.</i>	<i>Lejeunea Mackaii.</i>
<i>Polytrichum attenuatum.</i>	<i>L. patens.</i>
<i>Tortula princeps.</i>	<i>Odontoschisma sphagni.</i>
<i>Grimmia orbicularis.</i>	<i>Leptoscyphus pyrenaicum.</i>
<i>G. Hartmani.</i>	<i>Scapania umbrosa.</i>
<i>Pohlia acuminata.</i>	<i>Plagiochila tridenticulata.</i>
<i>Maiaum riparium.</i>	<i>Jungermannia pumila.</i>
<i>Hypnum irriguum.</i>	<i>J. crenulata.</i>
<i>Sphagnum Austini.</i>	<i>Nardia sphacelata.</i>
<i>S. teres.</i>	<i>Lunularia cruciata.</i>
<i>Lejeunea microscopica.</i>	

ADDITIONS TO COUNTY DOWN.

<i>Polytrichum attenuatum.</i>	<i>Odontoschisma sphagni.</i>
<i>Mollia verticillata.</i>	<i>Cephalozia divaricata.</i>
<i>Grimmia orbicularis.</i>	<i>C. connivens.</i>
<i>Pohlia acuminata.</i>	<i>Leptoscyphus interruptus.</i>
<i>Bryum prolijerum.</i>	<i>Scapania umbrosa.</i>
<i>Hypnum irriguum.</i>	<i>S. curta.</i>
<i>H. Kneiffii.</i>	<i>Jungermannia crenulata.</i>
<i>H. pulchellum.</i>	<i>Nardia sphacelata.</i>
<i>Sphagnum teres.</i>	<i>Lunularia cruciata.</i>
<i>Lejeunea Mackaii.</i>	<i>Anthoceros punctatus.</i>

ADDITIONS TO COUNTY ANTRIM.

<i>Oligotrichum incurvum.</i>	<i>S. intermedium.</i>
<i>Pottia Starkei.</i>	<i>Frullania fragillifolia.</i>
<i>Anisothecium crispum.</i>	<i>Lejeunea microscopica.</i>
<i>Webera sessilis.</i>	<i>L. calcarea.</i>
<i>Grimmia trichophylla.</i>	<i>L. patens.</i>
<i>G. Hartmani.</i>	<i>L. Mackaii.</i>
<i>Orthotrichum stramineum.</i>	<i>Pleurozia purpurea.</i>
<i>Tetraphodon bryoides.</i>	<i>Odontoschisma sphagni.</i>
<i>Funaria obtusa.</i>	<i>Trichocolea tomentella.</i>
<i>Mnium cuspidatum.</i>	<i>Plagiochila tridenticulata.</i>
<i>M. riparium.</i>	<i>Jungermannia pumila.</i>
<i>Hypnum heteropterum.</i>	<i>Nardia hyalina.</i>
<i>H. Borreri.</i>	<i>Cesia crenulata.</i>
<i>Sphagnum Austini.</i>	<i>Lunularia cruciata.</i>
<i>S. tenellum.</i>	

The only additions to County Derry are *Polytrichum urnigerum*, *Pottia Heimii*, *Tortula princeps*, *Mollia inclinata*, *Bryum ventricosum* and *Sphagnum subsecundum* var. *obesum*. Several named varieties are also added to preceding counties.

In the systematic list which follows, the authors have personally examined specimens of the greater portion of the plants recorded, and have taken pains to satisfy themselves of the correctness of the remainder. In the case of critical plants, the opinion of an authority has in all cases been obtained and followed. All plants concerning the identity of which there was any doubt, have been omitted; a number of records of *Rubi* are held over for this reason. The sequence and nomenclature of *Flora* have been followed throughout for sake of uniformity, except in those critical genera where the greatly extended knowledge which now prevails rendered it necessary to introduce the present terminology—thus the *Hieracia* are arranged and named according to Mr. Hanbury's list in *Journal of Botany*, July 1894, and Rev. Moyle Rogers has kindly revised our *Rubus* list so as to bring it into accordance with the ninth edition of *London Catalogue*.

We have to acknowledge gratefully assistance received in their special departments from Mr. J. G. Baker, Mr. Arthur Bennett, Monsieur Crepin, Messrs H. and J. Groves, Mr. F. J. Hanbury, and Rev. W. Moyle Rogers; to all of whom, as well as the various local botanists who have contributed, our best thanks are due.

For the editing of the *Phanerogamia*, and *Cryptogamia* as far as the end of *Characeæ*, R.L.P. is responsible; S.A.S. is accountable for the *Musci* and *Hepaticæ*.

15th May, 1895.

ABBREVIATIONS.

- Herb. D.M.—Herbarium of Dr. David Moore, now in Dublin Science and Art Museum.
- Hart *R.I.A.*—H. C. Hart: Plants of some of the Mountain Ranges of Ireland. *Proc. Royal Irish Academy*, 1884. The one or two references to Mr. Hart's subsequent report on the Mountain Plants of Ireland are distinguished by the date 1891.
- Lett *R.I.A.*—Rev. H. W. Lett: Report on the Mosses, &c., of the Mourne Mountain district, *Proc. Royal Irish Academy*, 1890.
- S. & P.—Stewart and Praeger: Report on the Botany of the Mourne Mountains, *Proc. Royal Irish Academy*, 1892.
- B.N.F.C.*—*Proceedings of the Belfast Naturalists' Field Club*.
- B.E.C.*—*Botanical Exchange Club Report*.
- Journ. Bot.*—*Journal of Botany*.
- I.N.*—*Irish Naturalist*.
- Shoobred *I.N.*—W. A. Shoobred, "A Botanical Trip to Co. Antrim," *Irish Naturalist*, 1894.
- Groves *I.N.*—H. & J. Groves, "The Distribution of the *Characeæ* in Ireland," *Irish Naturalist*, 1895.
- H.W.L.—Rev. H. W. Lett, M.A.
- C.H.W.—Rev. C. H. Waddell, B.D.
- S.A.S.—Samuel Alexander Stewart.
- R.Ll.P.—R. Lloyd Praeger.

PHANEROGAMIA.

RANUNCULACEÆ.

Thalictrum minus L., var. β **T. montanum** Wallr. 300—1600 feet.

Down—Pigeon Rock Mountain and Cove Mountain, S. & P.

T. flavum L.

Antrim—Langford Lodge, R.L.P.

Ranunculus trichophyllus Chaix.

Down—Lough Leagh (R.L.P.), *B.N.F.C.* 1891-2. Ditches below Newtownards, and pool on Conlig Hill, R.L.P.

Antrim—Stoneyford Reservoir, R.L.P.

R. heterophyllus Fries.

Down—Magheralin, C.H.W. Ditches near Crawfordsburn and Helen's Tower, R.L.P. "Moneyreagh River," printed in some copies of *Flora*, should be "Moneycaragh River."

R. Baudotii Godr. The plant recorded from Saintfield under this name in *Watson B.E.C. Report* 1893-94, is transferred to *R. peltatus*.

R. floribundus Bab. Specimens from Clandeboye lower lake have been doubtfully placed under this form by A. Bennett in *Watson B.E.C. Report* 1891-2. Further investigation is required.

R. penicillatus Dum.

Antrim—Abundant in Main R. from Randalstown to Lough Neagh, and in Braid R. at Ballymena, R.L.P.

R. peltatus Fries.

Down—Greencastle, Lisnacree, and Lough Island Reavy, S. & P. Common in the county.

var. **truncatus** Hiern.

Down—Ballyagherty near Saintfield, C.H.W., *Watson B.E.C.* 1893-4 Lough Mann, C.H.W.

R. circinatus Sibth.

Down—In the Lagan Canal close to its junction with Lough Neagh, R.L.P., *B.N.F.C.* 1892-3. An important extension of range.

R. hederaceus L. 0—1000 feet in the Mourne, S. & P.

R. flammula L. Ascends to 1700 feet in the Mourne, S. & P.

var. β **pseudo-reptans** Syme.

Down—Near Hilltown, S & P.

R. lingua L.

Down—North side of Pollramer Lough, Richd. Hanna. Marshes south of Ballydugan Lake, R.Ll.P.

Derry—Near Dungiven, Mrs. Leebody.

R. auricomus L.

Down—Rostrevor, S. & P. Glen at Knocknagoney near Holywood, R.Ll.P.

Antrim—Cushendall, Herb. D.M. Glendun, S. A. Brenan. Stoneyford, Crumlin, Langford Lodge, R.Ll.P.

Derry—Near Bellarena, Mrs. Leebody.

R. acris L. Ascends to 2450 feet in the Mourne, S. & P.

var. β **R. tomophyllus** Jord.

Down—Near Warrenpoint, S. & P. Perhaps frequent in the district.

R. repens L. Ascends to 1300 feet in the Mourne, S. & P.

Aquilegia vulgaris L.

Down—By the Shimna River near Newcastle, apparently well established, S. & P. It grows here on rough heathy ground, at a distance from any house, and has increased during the last ten years, R.Ll.P.

NYMPHÆACEÆ.

Nymphæa alba L.

Down—In almost every lake and pond.

Derry—Lakelets near Kilrea, and abundant in Killelagh Lough above Maghera, R.Ll.P.

PAPAVERACEÆ.

Papaver hybridum L.

Down—Roadside half-way between Killough and Ardglass, R.Ll.P., B.N.F.C. 1892-3.

P. rhœas L.

Down—Ardglass, S.A.S.

Derry—Fields near Magilligan railway station, R.Ll.P.

The plant is still abundant at its old stations, Killough Bay and Lisburn.

[P. somniferum L.

Down—Abundant in field near Rostrevor, S. & P.]

Meconopsis cambrica (Linn.) Vig.

Down—Ascends to 1300 feet at Rostrevor, S. & P. It ranges up and down the valley for several hundred feet, being abundant at one spot.

Derry—Magilligan braes, S. A. Brennan.

Glaucium flavum Crantz.

Down—Mill Bay in Carlingford Lough, Leestone near Kilkeel, and re-found in Templeton's station "5 miles south of Newcastle" (Glasdrumman), S. & P.

FUMARIACEÆ.**Fumaria capreolata** L. var. **α F. pallidiflora** Jord.

Common in Down and Antrim. Derry distribution not yet worked out.

var. **δ F. muralis** Sonder.

Down—Saintfield, C.H.W.; *Watson B.E.C. Report* 1893-4.

F. officinalis L.

Frequent throughout Down and Antrim.

CRUCIFERÆ.**Cheiranthus cheiri** L.

May fairly be reckoned as a naturalized plant in certain stations in the district, as ancient buildings at Quoile Castle, Carrickfergus Castle, and Larne.

Nasturtium palustre (Willd.) DC.

Down—Rostrevor and Narrow-Water, S. & P. Crossgar, R.Ll.P.

Antrim—Glendun, Shoolbred I.N. Bushfoot, R.Ll.P.

Barbarea vulgaris R.Br.

Down—Frequent in the Mourne district, S. & P. Crawfordsburn, Newtownards, Ballygowan, Downpatrick, R.Ll.P.

Derry—Kilrea and Bellarena, Mrs. Leebody.

B. intermedia Bor.

Down—Moygannon, Rostrevor, Killowen, Newcastle, S. & P. Scrabo and Conlig, R.L.P.

Antrim—Stoneyford, R.L.P.

Derry—Kilrea, Mrs. Leebody.

[B. præcox R.Br.

Down—Cultivated ground at Struell wells near Downpatrick, R.L.P., *B.N.F.C.* 1892-3.]

Arabis hirsuta (L.) R.Br.

Antrim—Tievebulliagh Mountain, S. A. Brennan.

Derry—Still plentiful in sandy fields and on sandhills at Magilligan, Mrs. Leebody, also R.L.P.

In Herb. D.M. is a note recording this plant from Cave Hill, Knockagh, and Torr Head, but we fear some mistake was made, as the plant has never been seen by any other botanist in these well-known places.

Cardamine amara L.

Down—Abundant at the "Witch Hole" on the Lagan at Glenmore near Lisburn, J. H. Davies; *S.A.S.*, *I.N.* 1894.

Sisymbrium thalianum (L.) Gaud.

Antrim—Wall-tops about Larne, Herb.D.M. Cushendun, S. A. Brennan.

Derry—Near Derry City, Mrs Leebody. Magilligan and Castlerock, R.L.P.

S. alliaria L.

Down—Searva Glen, H. W. Lett.

Antrim—Magheragall near Lisburn, and Altmore Glen, R.L.P.

[Erysimum cheiranthoides L.

Antrim—Wheat-field and roadside between Ballinderry and Lisburn, Herb. D.M.]

Sinapis alba L.

Down—Abundant in fields about Killowen, S. & P. Ardglass (R.L.P.), *B.N.F.C.* 1892-3.

Draba incana L.

Derry—Magilligan sandhills, small and not abundant, Mrs. Leebody, 1890. Abundant and fine on sand-dunes a mile N.E. of Magilligan railway station, R.L.P., 1894. Still occurs sparingly on Benevenagh cliffs.

D. verna L.

Down—Ballywalter and Ardglass, Templeton MSS. Saintfield, C.H.W.
 Antrim—Roadside near Stoneyford, R.L.P.

Cochlearia danica L.

Down—Plentiful from Warrenpoint to Greencastle, and at Annalong,
 S. & P.
 Antrim—On limestone rocks, White Park, Herb. D.M.
 Derry—Portstewart, Mrs. Leebody. Common by the Bann from
 Coleraine to the sea, R.L.P.

[Camelina sativa L.

Down—Newtownards, E. F. Linton, 1871, Herb. F. J. Hanbury.
 Antrim—Flax fields, Broughshane, Herb. Canon Grainger. Larne
 Curran, R.L.P.
 Derry—Magilligan, Herb. D.M. Among flax above Garvagh, R.L.P.]

Thlaspi arvense L.

Down—Abundant in fields at Killowen, S. & P.

Lepidium campestre (L.) R. Br.

Down—Fields at Killowen, S. & P.
 Antrim—Ram's Island, H.W.L.

L. Smithii (L.) Hook.

Antrim—Glenravel, R.L.P.
 Derry—Kilrea and Garvagh, Mrs. Leebody.

Senebiera coronopus (Gaert.) Poir.

Down—Rostrevor, Killowen, Kilkeel, Annalong, S. & P.

[S. didyma Pers.

Down—Killough, C.H.W. Railway at Dundrum, S.A.S.
 Antrim—Giant's Causeway, Miss Kuowles.
 Derry—Portstewart, Mrs. Leebody.
 Apparently increasing in Ireland, and spreading northward.]

Cakile maritima Scop.

Antrim—Beach at Ballintoy, R. Brown ; J. Britten, *Journ. Bot.* 1888,
 285.

Raphanus raphanistrum L.

Down—Frequent in Mourne district, S. & P. Dundonald, Ballykinler, Dundrum, R.L.P.

Antrim—Frequent in cornfields through the county, Herb. D.M. Rathlin Island, R.L.P.

Derry—Upperlands, Kilrea, Garvagh, and Bann mouth, R.L.P.

R. maritimus Sm.

Down—Shore near Ballywalter, J. H. Davies, and plentiful from Killough to St. John's Point, S.A.S.; S.A.S., *I.N.* 1894. Cranfield coast-guard Station, S. & P.

RESEDACEÆ.

Reseda lutea L. Certainly naturalized at Ballycastle, and probably at Magheramorne also.

VIOLACEÆ.

Viola palustris L. To 1350 feet in the Mourne, S. & P.

Down—Frequent in the Mourne district, S. & P. Near Loughbrickland, H.W.L.

Antrim—Common on the hills and bogs; many stations might be given.

V. sylvatica Fries. Ascends to 2796 feet, Hart *R.I.A.*

V. canina L. To 500 feet in the Mourne, S. & P.

Down—Shores of Lough Island Reavy, Bryansford, and Bloody Bridge, S. & P. Ballywalter, C.H.W.

Antrim—Cushendun, Shoolbred *I.N.* Ram's Island, Bushfoot, Ballycastle, R.L.P.

Derry—Kilrea, Mrs. Leebody. Common about the Bann mouth, R.L.P.

V. lutea Huds., var. β **V. Curtisi** Forst.

Down—Margin of Castlewella Lake, S. & P.

Antrim—Cushendun, Ballycastle, Bushfoot, R.L.P.

DROSERACEÆ.

Drosera rotundifolia L. To 1550 feet in the Mourne, Hart *R.I.A.* To 1450 feet there, S. & P.

D. intermedia Hayne.

Down—Pools by Kilkeel River at foot of Slieve Bingian, boggy ground by Colligan Bridge on the same stream, and in marshes S.W. of same place, S. & P.

The vague record in *Irish Flora* is thus verified. This station would appear to have been known to Templeton, who writes (MSS. Vol. A) "*Drosera longifolia*. Stalk scarcely longer than the leaves, capsule constantly three-valved; found in great abundance along with *D. rotundifolia* and *D. anglica* in the watery bog at the head of Kilkeel River, Mourne Mountains, August 9th, 1788." It must be noted that we did not find *D. anglica* there, or elsewhere in the district. In another note, after accurately describing *D. anglica*, Templeton writes "this is common on most of our bogs. *D. longifolia* I have not met with except on the watery bog at the head of Kilkeel River, Mourne Mountains."

D. anglica Huds.

Antrim—Slogan Bog near Randalstown, and near Tievebulliagh, Herb. D.M. Process near Glarryford, Miss Knowles. Abundant on bogs, both lowland and mountain, throughout northern Antrim, R.L.P.

Derry—In bogs near Newtownlimavady and Coleraine, R. Brown; J. Britten, *Journ. Bot.* 1888. Common on bogs near Kilrea and Garvagh, and on the margin of Lough Ouske in the Sperrin Mountains, R.L.P.

POLYGALACEÆ.

Polygala vulgaris L. To 2394 feet in the Mournes, S. & P.

var. **β. P. serpyllacea** Weihe. To 1720 feet in the Mournes, S. & P.

Down—In the Mournes, but not common, S. & P. Ballygowan, R.L.P.

Antrim—Common on the north Antrim coast, Shoolbred *I.N.*

var. **γ P. grandiflora** Bab.

Derry—Still sparingly on Benevenagh (R.L.P.) *B.N.F.C.* 1892-3.

ELATINACEÆ.**E. hydropiper** L.

Down—Plentiful at the north end of Lough Brickland, H.W.L.; R.L.P., *B.N.F.C.* 1890-1.

The record "Near Belfast, Dr. Mateer" (*Flor. Ulst.*) turns out unexpectedly to be correct, as shown by a large series of fine specimens in the herbarium of the late Dr. Boswell, now in possession of Mr. F. J. Hanbury. The specimens, which have been examined by R.L.P., bear the label "Lagan Canal near h. tide w. mark, Co. Antrim. Coll. Augt., 1847. and comm. by Dr. Mateer," and they were, no doubt, intended for distribution through the Botanical Exchange Club. It appears improbable that the plant still survives in this station, as the water is now impure, and attempts to refind it have failed.

CARYOPHYLLACEÆ.**[Saponaria officinalis L.**

Down—Bloody Bridge, S. & P. Mountstewart and Hillsborough, R.Ll.P.
 Antrim—Portballantrae, R.Ll.P.]

Silene anglica L.

Down—By the Annalong River, Hart R.I.A. Hilltown, S. & P.
 Derry—Still abundant at Magilligan, Mrs. Leebody, and R.Ll.P.

S. inflata Smith.

Down—Frequent in the Mourne district, S. & P. Dundonald, Conlig Hill, Ballynahinch, R.Ll.P.
 Antrim—Shore of Lough Neagh at Shane's Castle, Herb. D.M. Rasharkin, R.Ll.P.

S. maritima With.

Down—Abundant on Conlig Hill, some miles from the sea, at 400-500 feet elevation, R.Ll.P.

S. noctiflora L.

Down—At Holywood, but only as a casual; not seen for some years on Rough Island; seems to be uncertain in its appearance, R.Ll.P.

[S. dichotoma Ehrh.

Down—Abundant in several corn-fields between Saintfield and Crossgar. D. Redmond, also C.H.W., 1894. A plant of southern Europe, introduced with seed, apparently not hitherto observed in Ireland.]

Lychnis vespertina Sibth.

Down—Fields between Downpatrick and Strangford, B.N.F.C., 1893-4.

L. diurna Sibth.

Antrim—Plentiful about Cullybackey, Miss Knowles. Shane's Castle, R.Ll.P.

L. githago L.

Down—Maggie's Leap and Killowen, S. & P.
 Derry—Fields at Bann mouth, R.Ll.P.

Sagina apetala L.

Down—Warrenpoint, S. & P. Comber, Saintfield, Tullymurry, and near Pointzpass, R.Ll.P.

Antrim—Whitehead, R.Ll.P.

Derry—Walls at Magilligan railway station, R.Ll.P.

S. ciliata Fries.

Down—Sandhills at Newcastle, S. & P.

S. maritima Don.

Down—Killowen and Newcastle, S. & P. Donaghadee and Mahee Island, R.Ll.P.

Antrim—Water-edge at Larne, R. Brown; J. Britten, *Journ. Bot.*, 1888. Portballantrae, R.Ll.P.

S. nodosa (L.) E. Meyer.

Down—Mouth of Causeway Water, S. & P. Victoria Park near Belfast, and at Killough, R.Ll.P.

Derry—Still frequent, as at Magilligan and Bann mouth, Mrs. Leebody, and R.Ll.P. Kilrea, R.Ll.P.

Arenaria verna L.

Antrim—Glenariff, Shoolbred *I.N.* Scawt Hill, R.Ll.P.

A. trinervia L.

Down—Rostrevor, and about Tollymore Park, S. & P.

Antrim—Glenarm, Herb. D.M. Ram's Island, H.W.L. Between Ballycastle and White Park (R.Ll.P.), *B.N.F.C.*, 1892-3.

Derry—Dungiven, and near Limavady, Mrs. Leebody.

A. serpyllifolia L.

Down—Rockport and Downpatrick, R.Ll.P.

Antrim—Cushendall, Herb. D.M. Near Antrim, D. Redmond. Whitehead, Cushendall, Bushfoot, R.Ll.P.

Stellaria uliginosa Murr. Ascends to 2450 feet, S. & P.

Cerastium triviale Link. var. β . **C. holosteoides** Fries.

Derry—Abundant in meadows on the south side of the Bann below the railway bridge at Coleraine, Mrs. Leebody. A rare variety, not hitherto found in Ireland.

C. tetrandrum Curtis.

Down—Rostrevor and Killowen, S. & P. Kirkiston, C.H.W. Rockport, R.Ll.P.

Antrim—Rathlin Island, R.Ll.P., *B.N.F.C.*, 1889-90. Cushendun, R.Ll.P.

Derry—Benbradagh, Mrs. Leebody.

Spargularia rubra (L.) Pers.

Down—Abundant on the shores of Lough Island Reavy, S. & P.

S. salina Presl.

Derry—Near Limavady Junction, Mrs. Leebody.

Scleranthus annuus L.

Down—Frequent in the Mourne district, S. & P.

Derry—Near Kilrea, R.Ll.P.

MALVACEÆ.

Malva moschata L.

Down—Loughbrickland, H.W.L., *I.N.*, 1893. Tullyveery near Saintfield, C.H.W. Between Dundonald and Comber, and near Tullymurry, R.Ll.P.

Antrim—Shane's Castle deer-park, Herb. D.M.

M. rotundifolia L.

Down—Frequent from Killowen to Seafeld, S. & P.

Lavatera arborea L.

Antrim—"On the Shore at Ballantoy and grows also in the Sheep Island about $\frac{1}{2}$ mile from the Ballantoy shore; Sept., 1797," R. Brown. Still grows on Sheep Island, S. A. Brenan. Summit of Stackanisk, an isolated sea-stack at western end of Rathlin Island, R.Ll.P., *I.N.*, 1893.

We have no doubt that the plant is truly wild in these inaccessible maritime situations.

HYPERICACEÆ.

Hypericum androsæmum L.

Antrim—Cullybackey, Miss Knowles. Magheragall near Lisburn, Cairncastle, Cushendall, Fair Head, R.Ll.P.

Derry—Maghera, Kilrea, and Garvagh, R.Ll.P.

H. perforatum L.

Down—Near Newry, H.W.L. Tullymurry, R.Ll.P.

Antrim—Ram's Island, R.Ll.P.

Derry—Eglinton, Mrs. Leebody. Kilrea, R.Ll.P.

H. quadrangulum L. (Ex. p.). var. β **H. maculatum** Bab.

Down—By the Lagan Canal two miles above Lisburn, Richd. Hanna.

Abundant by the Lagan Canal close to Lough Neagh, H.W.L. and C.H.W. Near Marino railway station, R.Ll.P.

Antrim—Glenmore near Lisburn (J. H. Davies), *B.N.F.C.* 1892-3.

H. humifusum L. To 800 feet in the Mournes, S. & P.

Down—Frequent in the Mournes, S. & P. Scrabo and Ballynahinch, R.Ll.P.

H. pulchrum L. To 2000 feet in the Mournes, S. & P.**H. elodes** Huds. To 650 feet in the Mournes, S. & P.

Down—Several stations near Bryansford, Castlewellan, and Kilkeel, S. & P.

Derry—Ballyarnott race-course, Mrs. Leeboddy ; S.A.S., *J.N.* 1894.

GERANIACEÆ.**[Geranium striatum** L.

Down—Abundant in a lane near Comber, R.Ll.P.

Antrim—Near Ballinderry, W. D. Donnan.]

G. sylvaticum L. R.Ll.P. considers that Marino, where this plant grew (but suspiciously near a garden) until some ten years ago, was probably the "Holywood" station of *Flor. Ulst.*

The localities "Glenarm deerpark, and glen above Milltown at Cairncastle," given in *Flor. N.E.I.* for *G. pratense*, belong to *G. sylvaticum*. The range of these two plants in Antrim (and in Ireland) is thus seen to be very limited and well-defined, *G. sylvaticum* being confined to a few square miles in the vicinity of Glenarm, on the east coast of Antrim, while *G. pratense* is found along the north coast from Portrush to Ballycastle, a distance of some twenty miles.

G. pratense L. First found in Ireland by Templeton, not by Moore, as stated in *Flor. N.E.I.*

The Glenarm and Cairncastle stations of *Flora* are transferred to *G. sylvaticum*.

G. perenne Huds.

Down—Roadside near Castle Espie, C.H.W.

Antrim—Roadside near Whitewell quarries on Cave Hill, W. D. Donnan ; R.Ll.P., *B.N.F.C.* 1892-3.

G. lucidum L.

Antrim—Torr Head, Herb. D.M. Glenariff, Shoolbred *J.N.* Antrim, W. S. Smith. Scawt Hill, and lake-shore west of Shane's Castle, R.Ll.P.

Erodium cicutarium L'Herit. 0—1200 feet.

Down—Abundant on the Mourne coast-line; also at Bryansford and Castlewellan, 2 and 4 miles from the sea, S. & P. Holywood Hills, in fields at 400 feet, R.Ll.P.

Antrim—Larne, Cushendun, White Park Bay, R.Ll.P.

Derry—Summit and base of Benevenagh cliffs, *B.N.F.C.* 1892-3. The plant grows here at an elevation of 800—1200 feet, associated with *Silene acaulis*, *S. maritima*, *Dryas octopetala*, *Salix herbacea*, and other alpinies.

E. moschatum L'Herit.

Down—Annalong, Hart *R.I.A.*; and subsequently, S. & P. Waste ground south of Killough, Richd. Hanna; *S.A.S.*, *I.N.* 1894.

Robert Brown, in the MS. referred to in the Introduction, notes this species as “growing abundantly at the west end of the suburbs of Londonderry, Sept. 29th, 1795,” and “near Carrickfergus, July, 1797.” It has not been found in either of these stations by any recent observer, and it seems probable that *E. cicutarium* was the plant seen.

E. maritimum L'Herit.

Down—Abundant at Ballykinler, R.Ll.P. Still at Kirkiston, C.H.W.

LINACEÆ.**Radiola linoides** (L.) Gmel.

Down—Several places between Newcastle and Annalong, and at Causeway Water, S. & P.

Antrim—Abundant on Bushfoot sandhills, R.Ll.P.

CELASTRACEÆ.**Euonymus europæus** L.

Down—Warrenpoint, Annalong, Newcastle, S. & P. Lough Leagh and Castle Espie, C.H.W. Near Ballynahinch, Richd. Hanna. Near Hillsborough, *S.A.S.* Clough and Killyleagh, R.Ll.P.

Antrim—Muckamore Glen (R.Ll.P.) *B.N.F.C.* 1893-4. Cullybackey, Miss Knowles. Rasharkin, S. A. Brennan.

RHAMNACEÆ.**Rhamnus catharticus** L.

Antrim—Abundant on the shore of Lough Neagh at the place called the Selchin, Parish of Glenavy, Herb. D.M. This is another Lough Neagh record of a shrub that seems now quite lost through drainage.

Templeton notes this plant (MSS.) "in a hedge about 2 miles beyond Carrickfergus, June 30th, 1804." It may have been planted there, as it was formerly a notable plant, being much used medicinally. It has not been found there since.

R. frangula L.

Antrim—Bushy places near the River Main in Shane's Castle Park, Prof. R. O. Cunningham; R.L.P., *B.N.F.C.* 1890-1. The only recent record of this species.

LEGUMINOSÆ.

Ulex europæus L. Rises in the Mourne to 820 feet, Hart *R.I.A.*; to 800 feet, S. & P.

U. Gallii Planch. Upper limit in the Mourne 1600 feet, Hart *R.I.A.*; 1500 feet, S. & P.; at 1650 feet on Slieve Bearnagh, R.L.P.
Down—Aghaderg parish, H.W.L.

Sarothamnus scoparius L. To 800 feet in the Mourne, S. & P.

Ononis repens L.

Down—Sands east of Cranfield Point, S. & P. Margin of Lough Leagh (R.L.P.), *B.N.F.C.* 1891-2. Field at Loughbrickland, H.W.L.
Derry—Benone at Magilligan, sparingly, Mrs. Leeboddy.

var. **β horrida** Lange.

Down—Sandy shore at Ardglass, C.H.W.

O. spinosa L. has not been re-found in Co. Down, and was, no doubt, a casual, S.A.S.

Medicago lupulina L.

Down—Common in the Mourne district, S. & P. Conlig, Ballykinler, Tullymurry, Killowen, R.L.P.
Antrim—Ballycastle, Redbay, Shane's Castle, Portmore, Whitehead, Cave Hill, R.L.P.

[**M. sativa** L.

Down—Fields at Cultra and Craigavad, R.L.P.]

[**Mellilotus officinalis** Willd.

Antrim—Glenariff, Shoolbred *I.N.*]

M. arvensis W.

Antrim—Still abundant at several places between Kilroot and Larne, as it has been for the last 25 years, and may fairly be considered naturalized here.

[**M. parviflorus** Lam.

Antrim—Waste ground, Duncrue St., Belfast, R.Ll.P.]

Trifolium medium L.

Antrim—Throughout the county; many localities might be added.

Derry—Railway banks between Coleraine and Castlerock, R.Ll.P.

T. arvense L.

Down—Ballykinler sands, R.Ll.P.

Antrim—Carrickfergus, Cushendall, Ballycastle, Herb. D.M.

T. hybridum L. Frequent in sandy cultivated fields and waste ground, and thoroughly established as a colonist, S.A.S., *I.N.*, 1894.

Down and Antrim—Frequent.

Derry—Kilrea, and sandy fields at Bann mouth, R.Ll.P.

[**T. resupinatum** L.

Down—Saintfield, C.H.W.]

T. procumbens L.

Down—Frequent in Mourne district, S. & P. Shore-line below Holywood, and Ballykinler, R.Ll.P.

Antrim—Cushendall, Herb. D.M. Glenarm, R.Ll.P.

Derry—Eglinton, Mrs. Leebody.

Lotus corniculatus L. To 1200 feet in the Mourne, S. & P.

var. γ **L. crassifolius** Pers.

Derry—Rosses Bay on the Foyle, Mrs. Leebody.

L. pilosus Beeke. To 1150 feet in the Mourne, S. & P.

Down—Magheralin and Saintfield, C.H.W. Loughinisland, R.Ll.P.

Antrim—Glenariff, Shoolbred *I.N.* Ballymena, and plentiful at Racavan, Miss Knowles. Cushendun, S.A. Brenan. Mazetown, and Cairncastle, S.A.S. Rasharkin, R.Ll.P.

Derry—Frequent in North Derry, Mrs. Leebody. Kilrea, Garvagh, Maghera, and Coleraine, R.Ll.P.

Vica sylvatica L.

Down—Banks by the sea near Bloody Bridge, but not found elsewhere in Mourne district, S. & P. In a quarry by the railway north of Dundrum, plentiful, R.Ll.P.

Antrim—A var. with pure white flowers on limestone rocks between Larne and Glynn, Herb. D.M. Upper part of Colin Glen, and by the railway between Lambeg and Dunmurry, J. H. Davies. Glenariff, Shoolbred *I.N.* Altmore and Culraney, R.Ll.P.

V. orobus (L.) DC. Not found at Rostrevor (see *Raii Syn.* ed. II and *Flora N.E.I.*) by S. & P. Sherard's plant may have been *V. sylvatica*, which Templeton found there. The specimens in the Sherardian herbarium at Oxford do not settle the question.

V. sepium L. A white-flowered variety grows about Glenmore near Lisburn (J. H. Davies) and at Marino (R.Ll.P.).

V. angustifolia Roth.

Down—Frequent in Mourne district, S. & P. Kirkiston, C.H.W. Greypoint and Killyleagh, R.Ll.P.

Antrim—Ballycastle and Cushendun, Herb. D.M. Whitehead and Rasharkin, R.Ll.P.

V. lathyroides L.

Down—Ballymacormick Point, R.Ll.P.

Antrim—Cushendun, S. A. Breuan.

Derry—Still at Magilligan, Mrs. Leebody.

Lathyrus macrorrhizus Wimm. To 1,000 feet in the Mourne, S. & P.

var. **β. L. tenuifolius** Roth.

Down—Rostrevor, S & P.

ROSACEÆ.

Prunus communis L. To 1,000 feet in the Mourne, S. & P.

P. insititia L. May fairly be considered as naturalized in the district.

P. padus L.

Antrim—Refound in Glenshesk, Shoolbred *I.N.*

P. avium L.

Derry—Walworth Wood near Londonderry, Mrs Leebody.

P. cerasus L.

Down—Crawfordsburn, Clandeboye demesne, and Annalong, R.Ll.P., *B.N.F.C.* 1890-1. Near Crossgar and Downpatrick, R.Ll.P., *B.N.F.C.* 1892-3.

Antrim—Near Carrmoney church, planted, S.A.S. Ballycastle, R.Ll.P., *B.N.F.C.* 1892-3. Glendun, and Rasharkin, R.Ll.P.

Derry—Near Draperstown, R.Ll.P., *B.N.F.C.* 1892-3.

Not unfrequent, and although no doubt planted in some of its stations, in others appears naturalized.

Sanguisorba officinalis L.

Down—Refound near Donaghadee, growing abundantly and luxuriantly on a railway bank, J H. Davies ; S.A.S., *I.N.* 1894.

Poterium sanguisorba L.

Antrim—Abundant in a meadow at Glenmore near Lisburn, J. H. Davies, *I.N.* 1892. The late Mr. More inclined to the view that it had been introduced in this station. It has continued abundant during the three years it has been under observation, but is apparently confined to one meadow. The geological formation is New Red Sandstone, but the Chalk is not far away.

Agrimonia eupatoria L.

Down—Killowen, S. & P. Anadroghal near Lough Neagh, H.W.L. and C.H.W. Near Greypoint, Ballykinler, and Tullymurry, R.Ll.P.

Antrim—Very frequent.

Derry—Kilrea and Magilligan, Mrs. Leebody.

A. odorata Mill.

Down—Roadside near Steamboat quay, Downpatrick, R.Ll.P., *B.N.F.C.* 1892-3.

Antrim—Glendun, Shoolbred *I.N.*

Alchemilla vulgaris L. To 1500 feet in the Mourne, S. & P.

var β **A. minor** Huds.

Down—Scrabo Hill, R.Ll.P.

Antrim—Binnagee near Carnlough, W. D. Donnan. Knockagh and Dunloy, R.Ll.P.

The recent paper by Rev. E. F. Linton on British forms of *Alchemilla vulgaris* (*Journ. Bot.*, April, 1895), and an examination of local specimens kindly made by that botanist, show that the above nomenclature needs revision. What was treated as type in *Flora* should now be quoted as var *A. alpestris* Schmidt ; it is common in our district. The var. *A. minor* of *Flora* must now

be called var. *A. filicaulis* Buser; it is frequent on the basaltic plateau of Antrim and Derry. Restricted *A. vulgaris* L. (= *A. pratensis* Schmidt) probably occurs in our district also, but has not yet been separated.

Potentilla reptans L.

Down—Rostrevor, Killowen, and Newcastle, S. & P. Holywood and Millisle, R.L.P.

Antrim—Carrickfergus Junction, R.L.P.

P. tormentilla Sibth. var. β **P. procumbens** Sibth.

Down—Rostrevor and Newcastle, S. & P. Marino, R.L.P.: S.A.S., *I.N.* 1894.

Antrim—Glenariff, Glendun, and Glenshesk, Shoolbred *I.N.* Area in front of Belfast Museum, S.A.S., *I.N.* 1894.

Derry—Sandy fields at Bann mouth, and frequent in Kilrea district, R.L.P.

P. procumbens \times **tormentilla** (*P. suberecta* Zimmeter).

Down—Newtownbreda, 1849, Dr. Mateer; E. S. Marshall, *Journ. Bot.* 1894, and W. H. Purchas, *ibid.*

Antrim—Glenshesk (*fide* Marshall), Shoolbred *I.N.*

Rubus idæus L. To 1,400 feet in the Mourne, S. & P.

R. suberectus Anders.

Down—Margin of Castlewellan Lake, S.A.S., *B.E.C. Report* 1893. This is the plant which is recorded as *R. ammobius* by S. & P., on the authority of Prof. Babington. Dr. Focke, the describer of the latter species, has examined our plant, and places it under *R. suberectus*.

R. plicatus W. & N.

Down—Aughnadarragh near Saintfield, C.H.W.

R. Rogersii Linton.

Down—Old bog in Saintfield demesne, and boggy ground by Aughnadarragh Lake near Saintfield, C.H.W.

R. nitidus W. & N.

Down—Margin of Altnadua Lake, S. & P. (as var. *hamulosus*, which Mr. Rogers remarks appears to be exactly typical *nitidus*).

R. carpinifolius W. & N.

Down—Newcastle and Moygannon Glen, S. & P. Loughbrickland, H.W.L.

R. Lindleyanus Lees.

Down—Two stations in Aghaderg parish, H.W.L.

Antrim—Glenariff and Glendun, Shoolbred *I.N.*

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

R. erythrinus Genev.

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

R. rhamnifolius W. & N. (Sp. collect.)

Down—Between Belfast and Holywood, J. Ball; W. O. Focke, *Journ. Bot.* 1891. Between Ballyvarley and Gilford, H.W.L. Castlewellan Park, S.A.S.

Antrim—Glenariff and Glendun, Shoolbred *I.N.* Cairncastle, S.A.S.

Derry—Magilligan, J. Ball; W. O. Focke, *Journ. Bot.* 1891.

S. A. Brennan's Ballinderry record in *Journ. Bot.* 1895 is doubtful.

R. nemoralis P. J. Muell. (Genev. non Bab.)

Down—By the White water at Donard Lodge, S. & P. (as *R. macrophyllus* var. *umbrosus* Arr.)

var. b. **glabratus** Bab.

Down—By Ghann River, S. & P. (as *R. macrophyllus* var. *glabratus* Bab.)

R. pulcherrimus Neum.

Down—Lisdalgan near Saintfield, C.H.W.; S.A.S., *I.N.* 1894. Ballintaggart in Aghaderg parish, H.W.L. By Castlewellan Lake, S.A.S.

Antrim—Cave Hill, Glenariff, Glendun, and between Cushendall and Knocknacarry, Shoolbred *I.N.*

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

R. Muenteri Marss.

Antrim—Colin Glen, J. Ball; W. O. Focke, *Journ. Bot.* 1891.

Mr. Rogers considers that this form cannot as yet be included in British lists.

R. villicaulis Koehl.

Antrim—Glenariff and Glendun, Shoolbred *I.N.*

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

var. b. **Selmeri** (Lindeb.)

Down—Saintfield, C.H.W., *I.N.* 1894. Between Scarva and Gilford, and at Dromorebreague in Aghaderg parish, H.W.L. Drumcro near Magheralin, C.H.W.

Antrim—Glendun, Shoolbred *I.N.*

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

R. gratus Focke.

Antrim—Glendun, H.W.L.

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

R. pubescens Weihe. (Sp. collect.)

Down—Carrickmannan near Saintfield, C.H.W.

R. silvaticus W. & N.

Down—Between Milltown and Clonallen, H.W.L. Saintfield, C.H.W.

R. macrophyllus W. & N.

Down—White Water, Altnadua Lake, and Tollymore Park, S. & P. Saintfield, C.H.W. Aghaderg parish and Hillsborough, H.W.L.

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

var. b. **R. Schlechtendalii** (Weihe).

Down—Moygannon Glen, S. & P. Saintfield, C.H.W. Loughbrickland, H.W.L.

R. micans Gren. and Godr.

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

R. pyramidalis Kalt.

Down—Tollymore Park and Donard Lodge, S. & P. Saintfield, C.H.W.

Antrim—Glenariff, Shoolbred *I.N.*

R. leucostachys Schleich.

Antrim—Cave Hill, near Larne, Glenariff, Shoolbred *I.N.*

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

R. mucronatus Blox.

Down—Saintfield, C.H.W.

R. Gelertii Frider var. b. **criniger** Linton.

Down—Aghaderg glebe at Loughbrickland, H.W.L.

R. Leyanus Rogers.

Down—Saintfield, C.H.W.; *Watson B.E.C.* 1893-4 (as *R. Drejeri*).

“Very strong, and differing from the ordinary English plant.”—W. M. Rogers.

R. radula Weihe.

Down—Aghaderg glebe at Loughbrickland, H.W.L.

Antrim—Hedgerows near Larne, Shoolbred *I.N.*

Derry—Ballinderry, S. A. Brennan, *Journ. Bot.* 1895.

R. echinatus Lindl.

Antrim—Cave Hill, Glenariff, Glendun, Shoolbred *I.N.*

R. rudis W. & N.

Down—Aghaderg glebe at Loughbrickland, H.W.L. "Hardly typical,"
W. M. Rogers.

R. scaber W. & N.

Down—Aghaderg glebe at Loughbrickland, H.W.L. S. A. Brennan's
Ballinderry record in *Journ. Bot.* 1895 is omitted as doubtful.

R. fuscus W. & N.

Down—Two stations in Aghaderg parish, H.W.L.

R. rosaceus W. & N.

Down—Near Maralin, H.W.L. ("var. near *infecundus*," W. M.
Rogers.)

var. b. **R. hystrix** (W. & N.)

Antrim—Glenariff, Shoolbred *I.N.*

R. Koehleri W. & N.

Down—Newcastle, S. & P.

Antrim—Glenariff and Glendun, Shoolbred *I.N.*

var. b. **R. pallidus** Bab.

Down—Tollymore Park, S. & P. Saintfield, C.H.W.; S.A.S., *I.N.*
1894. Near Scarva and at Loughbrickland, H.W.L.

R. hirtus W. & K. var. c. **R. Kaltenbachii** Metsch.

Down—Ballintaggart in Aghaderg parish, H.W.L.

R. dumetorum W. & N.

Antrim—Cave Hill, and near Larne, Shoolbred *I.N.* Glendun, S. A.
Brennan, *Journ. Bot.* 1895.

var. b. **R. diversifolius** (Lindl.)

Down—In Aghaderg parish, H.W.L.

R. corylifolius Sm. Ascends to 1400 feet in the Mourne, S. & P.

a. *R. sublustris* (Lees.) Common. Many localities might be added.

var. b. *R. conjungens* (Bab.)

Antrim—Near Larne, Shoolbred *I.N.*

R. saxatilis L. 800-2000 feet in the Mourne, S. & P.

Down—Frequent on the Mourne Mountains, S. & P.

Antrim—Knockagh, in fine fruit (R.Ll.P.), *B.N.F.C.* 1892-3.

Derry—Heathy places near Kilrea, R.Ll.P.

R. chamaemorus L.

Derry—A small patch on the Derry side of the county boundary on the west side of Dart Mountain, H. C. Hart, *Journ. Bot.* 1892, and Hart and Barrington, *I.N.* 1892. A most interesting confirmation of Prof. Murphy's record (*Flora Hibernica*).

Geum intermedium Ehr.

Antrim—Near Muckamore, (R.Ll.P.), *B.N.F.C.* Excursion; *I.N.* 1893.

G. rivale L.

Down—Decidedly rare in the county. Absent from the Mourne district, S. & P. Only observed in the glen at Holywood Waterworks, R.Ll.P.

Rosa spinosissima L. To 2000 feet in the Mourne—a remarkable elevation, S. & P.

var. *R. ciphiana* Sibbald.

Derry—Magilligan, Mrs. Leebody.

R. hibernica Sm. var. b. *glabra*, Baker.

Down—Tillysburn, S.A.S. M. Crepin places the Tillysburn plant under this variety, adding "un peu pubescente." He considers *R. hibernica* a hybrid—*R. pimpinellifolia* x *canina* = *spinosissima* x *canina*.

[*R. pomifera* Herm.

Antrim—Woods in Shane's Castle Park, S.A.S.]

R. involuta Sm.

Down—Mountain roads about Hilltown (aggregate), S. & P.

Antrim—Glendun ("form," W. M. Rogers), S. A. Brenan. Top of Colin Glen, *Flora Belfastensis* (*R. Sabini*). This record was considered doubtful, but a specimen gathered there by S.A.S. in 1894 has been identified by M. Crepin.

var. *R. Sabini* Woods. The Braid Valley plant recorded in *I.N.*, 1894, p. 221 is not *R. Sabini*; nor can we be quite sure of the Hilltown plant of S. & P.

***R. mollissima* Willd.**

Down—Near Dundrum, by the Quoile at Downpatrick, and at Ballynahinch, S.A.S.

Antrim—Waterloo near Larne (R.Ll.P.), *B.N.F.C.* 1890-1. Glendun and Glenshesk, Shoolbred *I.N.* Rasharkin, and between Ballymena and Broughshane, R.Ll.P.

Derry—Common near Kilrea weir, R.Ll.P.

***R. tomentosa* Smith.** To 980 feet in the Mourne, S. & P.

var. d. ***scabriuscula* Sm.**

Antrim—Near Cushendall, Shoolbred *I.N.*

***R. rubiginosa* L.**

Down—Hilltown, S.A.S. Near Comber and Downpatrick, R.Ll.P.

Antrim—Shane's Castle, Ram's Island, Dervock, Rasharkin, R.Ll.P.

Derry—Frequent in North Derry, Mrs. Leebody. Portglenone, R.Ll.P.

R. micrantha Smith. This species must be deleted from our flora. The Cushendun plant has been finally decided to be *R. rubiginosa*.

***R. canina* L., var. a. *lutetiana* (Leman).**

Down—Comber, S.A.S.

Antrim—Common in the glens, Shoolbred *I.N.* Larne and Cairncastle, S.A.S.

var. e. ***dumalis* (Bechst.)**

Antrim—Common in the glens, Shoolbred *I.N.* Crumlin, Ballygilbert north of Cairncastle, and near Belfast, S.A.S.

var. j. ***dumetorum* (Thuill.)**

Down—Killowen, S.A.S.

Antrim—Mazetown, S.A.S.

var. n. ***tomentella* (Leman).**

Antrim—Colin Glen and Crow Glen, S.A.S.

var. w. ***subcristata* Baker.**

Antrim—Glendun, and sandy ground by the river in Glenshesk, Shoolbred *I.N.*

***R. glauca* Vill.**

Antrim—Near Belfast, and Waterloo near Larne, S.A.S. Determined by M. Crepin.

R. arvensis Huds.

Down—South of Rostrevor, and near Bloody Bridge, S. & P. Between Crossgar and Killyleagh (R.Ll.P.), *B.N.F.C.* 1891-2. Rademon, Kilmore near Crossgar, and Saintfield, C.H.W. Loughinisland, R.Ll.P.

Antrim—Near Ballinderry, R.Ll.P.

var. **c. bibracteata** (Bast.).

Antrim—Hedgerow near Cushendun, Shoolbred *I.N.*

Cratægus oxyacantha L. To 1000 feet in the Mourne, S. & P.**Pyrus malus** L.

Down—Frequent in Mourne district, doubtfully native, S. & P.

Antrim—Frequent about Stoneyford, R.Ll.P.

Derry—Bond's Glen, Mrs. Leebody. Upperlands and Kilrea, R.Ll.P.

P. aucuparia Gaert.

Antrim—Rathlin Island, R.Ll.P., *B.N.F.C.* 1889-90.

P. aria (L.) Sm.

Antrim—Glendun, 1868, S. A. Brennan (type! S.A.S.).

The specimen in Dr. Moore's Derry collection appears to be *P. rupicola*.

LYTHRACEÆ.**Peplis portula** L. To 1150 feet in the Mourne, S. & P.

Down—Throughout the Mourne district, S. & P. Loughbrickland, H.W.L. Dundonald, R.Ll.P.

Derry—Enagh Lough, Mrs. Leebody.

ONAGRACEÆ.**Epilobium angustifolium** L. To 1500 feet in the Mourne, S. & P.

Down—Cliffs of Eagle mountain, and cliffs south of Blue Lough, S. & P.

Antrim—Gobbins cliffs (R.Ll.P.), *B.N.F.C.* 1892-3. Scawt Hill, Carnlough, Parkmore, Altmore, Culraney, Dunseverick, R.Ll.P.

E. obscurum × **palustre**.

Antrim—Glenariff, Glenshesk, and Giant's Causeway, Shoolbred *I.N.* (*teste* E. S. Marshall).

E. palustre L. To 1150 feet in the Mourne, S. & P.

Down—Frequent in the Mourne district, S. & P. Sydenham, Dundonald, Conlig, Ballynahinch, and Narrow-water, R.Ll.P.

Antrim—Glenariff, Glendun, Fair Head, Shoolbred *L.V.* Bog Meadows, Killagan, Lough Naroon, Bushfoot, R.Ll.P.

Derry—Kilrea, Bannmouth, and Magilligan, R.Ll.P.

***Circaea alpina* L.**

Down—Tollymore Park, S. & P.

Antrim—Langford Lodge, and still in Glenariff, R.Ll.P.

Derry—By the Roe near Limavady, Mrs. Leebody.

In addition to its native mountain habitats, it occurs frequently about Belfast as a garden weed—and a troublesome one too—as at Windsor Avenue, Cliftonville, several gardens at Holywood, and Clandeboye, R.Ll.P.

var. β ***C. intermedia* Ehr.**

Down—As a weed in a garden at Holywood, R.Ll.P.

Antrim—Glenariff and Glenshesk, Shoolbred *L.V.* Glendun, R.Ll.P.

HALORAGACEÆ.

***Myriophyllum spicatum* L.**

Down—Abundant in Claudeboye Lakes, R.Ll.P.

Antrim—Abundant in Portmore Lough, R.Ll.P.

Derry and Antrim—In Lough Neagh at Toome, abundant in Lough Beg, and thence down the Bann to the sea, R.Ll.P.

***Hippuris vulgaris* L.**

Down—Altnadua and Moneyscalp, S. & P. Pollrainer Lake near Crossgar, C.H.W. Loughinisland and Killinchy, R.Ll.P.

Antrim—Between Ballycastle and White Park (R.Ll.P.), *B.N.F.C.* 1892-3. Portmore, H.W.L. Bog north of Ballymoney, R.Ll.P.

Derry—Bann mouth, R.Ll.P.

PORTULACÆÆ.

***Montia fontana* L.** To 2450 feet in the Mourne, S. & P.

CRASSULACEÆ.

***Sedum rhodiola* DC.** 1000—2000 feet in the Mourne, S. & P.

Down—Pigeon Rock Mountain, and along the Slieve Muck ridge, S. & P.

Antrim—Abundant on the coast north of Torr, R.Ll.P.

S. telephium L.

Down—Dromantine, H.W.L. and C.H.W. Holywood Hills, Ballygowan, Downpatrick, R.Ll.P.

Antrim - Ballyclose and Craigbilly, Miss Knowles.

Derry—Near Maghera, R.Ll.P.

S. anglicum Huds. To 1000 feet in the Mourne, S. & P.

SAXIFRAGACEÆ.

Saxifraga stellaris L. To 2350 feet in the Mourne, Hart R.I.A.

Down—Not abundant on the Mourne, as stated by Templeton. It is abundant on the N.W. slopes of Donard and Commedagh, but elsewhere it was seen by S. & P. only sparingly on Cove Mountain and at Hare's Gap.

S. hypnoides L.

Derry—Benbradagh, Mrs. Leeboddy.

S. tridactylites L.

Down—On walls and gravel at Kilmore near Crossgar, and on rocks by the coast at Cloughey Bay, C.H.W.

Derry—Bellarena, Mrs. Leeboddy.

Chrysosplenium oppositifolium L. To 2450 feet in the Mourne, S. & P.

Parnassia palustris L.

Antrim—Roadside near Drumnasole, B.N.F.C. 1890-1. Carnlough, Altmore, Kinbane Head, R.Ll.P.

Derry—Mouth of the Roe, R.Ll.P.

UMBELLIFERÆ.

Hydrocotyle vulgaris L. To 1500 feet in the Mourne, S. & P.

Sanicula europæa L. To 1500 feet in the Mourne, S. & P.

Eryngium maritimum L.

Down—Very abundant from Greencastle Point to Nicholson's Point, S. & P.

Cicuta virosa L.

Down—By the Canal near Goraghwood, R.Ll.P.

***Apium graveolans* L.**

Antrim—Redbay, Miss Knowles. Still occurs both north and south of Carrickfergus, S.A.S.

A. nodiflorum (L.) Reich. var. β *A. repens* (L.). Not now known in district 12, and was probably a misnomer.

***A. inundatum* Reich.**

Down—Near Warrenpoint and Kilkeel, S. & P. Magheralin, and Poll-ramer Lake near Crossgar, C.H.W. Killinchy, Ballynahinch, Ballykinler, R.L.P.

Antrim—Gawley's Gate on Lough Neagh, and by the Bann occasionally, R.L.P.

Derry—Lakes at Kilrea, and along the course of the Bann, R.L.P.

var. **Moorei** Syme.

Down—Marsh at Saul near Downpatrick, R.L.P.

Derry—By the Bann three miles below Kilrea, R.L.P.

***Carum verticillatum* Koch.**

Antrim—The Crumlin record must be expunged; S.A.S is satisfied that it was an error.

Derry—It is immensely abundant at its Coleraine station, and extends down the Bann to the sandhills of the coast.

It cannot be found near Belfast, and the present range in our district of this rare Irish plant is thus seen to be very restricted, being confined to the meadows bordering the tidal portion of the Bann, and the headlands at Giant's Causeway.

[*C. carui* L.]

Down—Holywood, R.L.P.

Antrim—Cushendun, S. A. Brennan. Carnlough, Portballantrae, Causeway, and on roadsides and heaths on Rathlin Island, R.L.P.]

[*Petroselinum sativum* Hoffm.]

Down—Reagh Island in Strangford Lough, C.H.W. Walls of old castle at Ringhaddy, R.L.P.]

***Pimpinella saxifraga* L.**

Antrim—Near Broughshane, Miss Knowles. Antrim and Rasharkin, R.L.P.

***Sium erectum* Huds.**

Down—At a number of places near Downpatrick, and in Carrigullion Lake near Killinchy, R.L.P., B.N.F.C. 1892-3.

***Oenanthe fistulosa* L.**

Antrim—Shores of Lough Beg, and thence to Coleraine occasionally, R.L.P.

Derry—Enagh Lough, Mrs. Leebody.

***O. Lachenalii* Gmel.**

Down—Killowen, and mouth of Causeway water, S. & P.

Antrim—Shore at Giant's Causeway, R.L.P.

***O. phellandrium* L.**

Down—Lough Leagh (R.L.P.), *B.N.F.C.* 1891-2. Shore of Lough Neagh, C.H.W. Portavoe, Quoile River, Money Lake, R.L.P.

Derry—Magilligan, Mrs. Leebody.

***Aethusa cynapium* L.**

Down—Warrenpoint, Rostrevor, and abundant at Killowen, S. & P. Saul, R.L.P.

Antrim—Brown's Bay on Islandmagee (R.L.P.) *B.N.F.C.* 1892-3. Crumlin Waterfoot, Miss Knowles. About Belfast, Whitehead, and Larne, R.L.P.

Derry—Coleraine, Mrs. Leebody. Upperlands. R.L.P.

***Ligusticum scoticum* L.**

Antrim—Rocks on the shore at Bushfoot, R.L.P., and recently refound at Garron Point, S. A. Brennan; R.L.P., *B.N.F.C.* 1892-3.

Derry—Sparingly at Downhill, and still plentiful between Portrush and Portstewart, Mrs. Leebody.

Silaus pratensis (L.) Bess. Has not been refound, and was no doubt a casual.

***Angelica sylvestris* L.** To 1500 feet in the Mourne, S. & P.

[*Peucedanum ostruthium* Koch.

Antrim—Stoneyford, R.L.P. Not now on Cave Hill, S.A.S.

Derry—Downhill, Mrs. Leebody.]

***Pastinaca sativa* L.**

Down—Holywood and Dundrum, probably casual, R.L.P.

Antrim—By the new path to Cave Hill, casual, S.A.S.

Derry—Still abundant at Magilligan, and quite naturalized, R.L.P.

***Heracleum sphondylium* L.** To 1,500 feet in the Mourne, S. & P.

Torilis nodosa (Huds.) Gaert.

Down—Abundant near Killowen, S. & P. Whiterock near Killinchy, C.H.W.

Antrim—Rathlin Island, R.L.P., *I.N.* 1893.

Scandix pecten-veneris L.

Down—Abundant at Killowen, S. & P. Killinchy (R.L.P.), *B.N.F.C.* 1890-1. Lough Leagh (R.L.P.), *B.N.F.C.* 1891-2. Craigavad, Downpatrick, R.L.P.

Antrim—Rathlin Island, R.L.P., *B.N.F.C.* 1889-90. Carnlough, Dunseverick, Carrick-a-rede, Portballantrae, R.L.P.

Derry—Magilligan, Mrs. Leebody.

Chærophyllum anthriscus Lam.

Down—Killinchy (R.L.P.), *B.N.F.C.* 1890-1. Seashore at Ballyhornan Bay, very luxuriant, R.L.P.

Antrim—Still on the Curran at Larne, R.L.P.

Myrrhis odorata L.

Down—Roadside south of Spelga, S. & P. Near Saintfield and Kearney's Point, C.H.W. Loughbrickland and Annaclone, H.W.L. Holywood Hills, Crawfordsburn, &c., R.L.P.

Antrim—Rathlin Island, R.L.P., *B.N.F.C.* 1889-90. Glendun, S. A. Brennan. Donegore, Dunadry, Stoneyford, Torr, Dunseverick, Giant's Causeway, R.L.P.

Conium maculatum L.

Antrim—At Portmore; rare inland, R.L.P.

Smyrniolus olusatrum L.

Down—Frequent in Mourne district, S. & P. Knock and Downpatrick, R.L.P.

Antrim—Near Antrim, R.L.P.

Derry—Frequent in North Derry, Mrs. Leebody.

HEDERACEÆ.

Hedera helix L. To 2000 feet in the Mourne, S. & P.

CAPRIFOLIACEÆ**Sambucus ebulus** L.

Down—Near Donaghmore, H.W.L. Near Ballynahinch, and still at Holywood, R.L.P.

Antrim—Dunadry and Cushendall, R.L.P.

Viburnum opulus L.

Down—Rostrevor, Altnadua Lake, and Tollymore Park, S. & P. Tullymurry, R.L.P.

Antrim—Near Slemish, C.H.W. & H.W.L. Clogh. H.W.L. Cullybackey, Miss Knowles. Ballinderry, Glenariff, Rasharkin, R.L.P.

Derry—Glen at Benevenagh, Mrs. Leebody. Kilrea and Garvagh, R.L.P.

Lonicera periclymenum L. To 2,000 feet in the Mourne, S. & P.

RUBIACEÆ.

Sherardia arvensis L.

Down—Frequent in the Mourne district, S. & P. Saintfield, and near Crossgar, C.H.W.

Antrim—Rasharkin, R.L.P.

Derry—Maghera, Kilrea, and Garvagh, R.L.P.

Galium boreale L.

Antrim—Among the rocks of Agnew's Hill 1804, Templeton MSS. Glenariff, Shoolbred I.V. Garron Point, between Ballymena and Broughshane, and by the river above Bushmills, R.L.P.

G. cruciatum (L.) With.

Down—Still plentiful on the side of Downpatrick rath, but no longer to be found at the Cathedral.

G. mollugo L.

Down—Lawn at Rowallen near Saintfield, D. Redmond; S.A.S., I.V. 1894.

Antrim—Riverside near Cullybackey, S. A. Brennan. Still at Glenarm Park, R.L.P.

Derry—Near Eglinton, Mrs. Leebody; H. C. Hart, *Journ. Bot.*, 1892.

VALERIANACEÆ.

Valeriana officinalis L. var. **a Mikani** (Wats.)

Down—At 1500 feet on Slieve Muck, S. & P.

Antrim—Common in the Glens; the only form observed, Shoolbred I.V. Sparingly by Lagan River at Mazetown, S.A.S.

var. β **V. sambucifolia** Mikan.

Down—Mourne Park and Tullybranagan, S. & P. Maxwell's Court near Comber, S.A.S.

Antrim—Plentiful by the Lagan at Mazetown, S.A.S.

Valerianella olitoria (L.) Moench.

Down—Frequent in the Mourne district, S. & P. Saintfield, C.H.W.

Antrim—Ballymena and Ballyclare, Miss Knowles. Larne, Scawt Hill, and abundant on chalk rocks on Garron Point, forming a close turf with *Saxifraga hypnoides* and *Hieracium anglicum*, R.Ll.P.

V. carinata Lois.

Down—Is increasing steadily at Dundonald, R.Ll.P.

V. dentata Willd.

Down—Maggie's Leap, Lisnacree, and abundant about Killowen and Seatfield, S. & P. Killinchy (R.Ll.P.), *B.N.F.C.* 1890-1, and margins of Lough Leagh (R.Ll.P.), *B.N.F.C.* 1891-2.

DIPSACACEÆ.

Scabiosa succisa L. To 1900 feet in the Mournes, S. & P.

S. arvensis L.

Down—Frequent in the Mourne district, S. & P. Ballynahinch, R.Ll.P.

Antrim—About Ballymena, Miss Knowles.

Derry—Dungiven and Kilrea, Mrs. Leebody.

COMPOSITÆ.

Eupatorium cannabinum L.

Antrim—Lambeg, Templeton MSS. Ram's Island, Altmore, and Torr Head, R.Ll.P.

Derry—Cliffs at Downhill, R.Ll.P.

Petasites vulgaris L.

Down—Very rare in the Mourne district, S. & P. It is not generally common in the county, though abundant in Antrim.

P. fragrans L. Quite naturalized, and spreading throughout the district.

Tussilago farfara L. To 1900 feet in the Mournes, S. & P.

Erigeron acris L. The late Mr. A. G. More has informed us that this plant has been found on sandhills north of Newcastle; this is almost the same station as given in *Flora*, but is an interesting confirmation.

Solidago virgaurea L. To 2449 feet in the Mourne, S. & P.

var. **β. angustifolia** Koch.

Down—By the Bann above Hilltown, and abundant by the river in Tollymore Park, S. & P.

var. **γ** *S. cambrica* Huds. Not now in Tollymore Park, S. & P.; must be deleted from our flora.

Inula helenium L.

Down—Near Ballynahinch and Saul, R.Ll.P.

Antrim—Antrim, Carnlough, Portballantrae, Dunseverick, R.Ll.P.

Derry—Waste ground north of Kilrea, R.Ll.P.

Filago germanica (Huds.) L. To 500 feet in the Mourne, S. & P.

Down—Frequent in the Mourne district, S. & P. Loughinisland, R.Ll.P.

Antrim—Portrush, Bushfoot, Killagan, R.Ll.P.

Derry—Kilrea, Mrs. Leebody.

F. minima (Fries) Huds. To 500 feet in the Mourne, S. & P.

Gnaphalium sylvaticum L. To 800 feet in the Mourne, S. & P.

Down—Frequent in Mourne district, S. & P. Ballygowan, R.Ll.P.

Antrim—Glenariff, Shoolbred *L.N.* Near Ballymena, Miss Knowles. Scawt Hill, Culraney, Portrush, R.Ll.P.

Derry—Bellarena (R.Ll.P.), *B.N.F.C.* 1892-3. Kilrea and Upperlands, R.Ll.P.

Antennaria dioica (L.) R. Br.

Down—Kilbroney River, Slieve Muck, Slieve Meel-beg, S. & P.

Antrim—Clinty Hill near Ballymena, Miss Knowles. Killagan, C.H.W. Newtown Crommelin, S. A. Brennan. Pollan Burn, heaths west of Glenarm, Cushendall, Bushfoot, Rathlin Island, R.Ll.P.

Derry—Near Maghera and Garvagh, R.Ll.P.

[**Anthemis arvensis** L

Down—Field at Glasdrumman, S. & P. Sandy field at Ballykinler, R.Ll.P.].

Matricaria inodora L. var. **β salina** Bab.

Antrim—Giant's Causeway, Shoolbred *L.N.*

var. **γ maritima** (L.).

Antrim—Redbay, Shoolbred *I.N.* 1894.

M. chamomilla L.

Down—Margin of Lough Island Reavy, probably casual, S. & P. Near Queen's Island, and on railway at Newry, R.Ll.P.

Antrim—Magheragall near Lisburn, and Ballygalley Head, R.Ll.P.

Increasing along the Antrim coast, and at least naturalized there : perhaps only casual elsewhere.

Chrysanthemum segetum L. To 800 feet in the Mournes, S. & P. The name *Gilgovan*, applied by inadvertence to *C. leucanthemum* in *Flora*, pertains to this species.

Tanacetum vulgare L.

Down—Occasionally in the Mourne district, S. & P. Raholp old church, and Castle Island below Downpatrick, R.Ll.P.

Antrim—Glendun, S. A. Brennan. Dunadry, Glenariff, R.Ll.P.

Senecio sylvaticus L. To 800 feet in the Mournes, S. & P.

Down—Not rare in Mourne district, S. & P. Saintfield, C.H.W. Between Dromara and Banbridge, and near Goraghwood, H.W.L. Cotton Moss, Killinchy, Loughinisland, R.Ll.P.

Derry—Ballyscullion near Lough Beg, Mrs. Leebody. Castlerock, R.Ll.P.

[**S. saracenicus** L.

Down—Saintfield, C.H.W.

Derry—Near Culmore, Mrs. Leebody. Roadsides at Magilligan, R.Ll.P. Possibly naturalized].

Bidens tripartita L.

Down—By the Bann near Hilltown, S. & P. Brown bog near Loughbrickland, H.W.L. Saul and Crossgar, R.Ll.P.

Derry—Kilrea, R.Ll.P.

B. cernua L.

Down—Killowen, Lisnacree, and near Kilkeel and Newcastle, S. & P. Loughinisland, C.H.W. Brown Bog near Loughbrickland, H.W.L.

var. **radiata** Sond.

Down—Plentiful at Carrickmannan Lake, S.A.S., and in the Quoile marshes, R.Ll.P. ; S.A.S., *I.N.* 1894.

Saussurea alpina DC.

Down—Sparingly in fissures of dripping vertical slate rocks at 2000 feet on Slieve Muck North, S. & P. An interesting addition to the alpine plants of the district.

Arctium nemorosum Lej.

Down—Moygannon and Newcastle, S. & P. Ballykinler, Ballyhornan, and Ballyholme, S.A.S.

Antrim—Fair Head, Shoolbred *I.V.* Islandmagee and near Antrim, S.A.S.

A. intermedium Lange.

Down—Sandy waste at Benderg Bay, and by old road from Ballynahinch to Drumanness, S.A.S.

Antrim—Quarry at Ballygalley Head, S.A.S.

Derry—Magilligan, Mrs. Leebody.

A. minus Schkur.

Down—Benderg Bay and at Moygannon, S.A.S.

var. majuscula Hartm.

Antrim—Riverside at Crumlin, and at Bankheads near Larne, S.A.S. (*vide* Svante Murbeck).

The specimens so named by the eminent Swedish botanist seem to be almost identical with the *A. intermedium* Lange of Babington's Manual ed. 8.

Carduus crispus L. var. β . **C. acanthoides** L.

Down—Fields and waste ground at Killowen, S. & P.

Antrim—Refound at Larne by R.L.P. ; S.A.S. *I.V.* 1894.

Derry—Still common at Magilligan; recently seen by R.L.P. at Bellarena (*B.N.F.C.* 1892-3) and about Magilligan station.

C. palustris L. To 1000 feet in the Mourne, S. & P.**C. pratensis** Huds.

Down—Throughout the Kilbroney valley to 700 feet, sparingly by the Causeway Water, and by the Shimna near Newcastle, S. & P.

Antrim—Northern extremity of Lough Beg, Killagan, Dunloy, and Portballantrae, R.L.P.

Derry—Castlerock, Bran Lough above Maghera, near Garvagh, and by the Bann at Coleraine, R.L.P.

[*Silybum marianum* Gaert.

Down—Crawfordsburn, R.Ll.P.

Antrim—White Park Bay, R.Ll.P.]

[*Onopordum acanthium* L.

Antrim—Waste ground near a cottage at Ballygalley Head, S.A.S. and R.Ll.P., 1887. A casual since lost.]

***Cichorium intybus* L.**

Down—Cornfield near Kilkeel, casual, S. & P. Uncultivated ground at Lisnatrunk, J. H. Davies. Saintfield, and quarry bank at Magheralin, C.H.W.

Antrim—Broughshane, Herb. Canon Grainger. Glynn, and Portrush sandhills, casual, R.Ll.P.

R.Ll.P. considers that this plant is only a casual in the district.

***Leontodon hirtus* L.**

Down—Fields by the sea at Dalchoolin near Craigavad, R.Ll.P., B.N.F.C. 1892-3. Lawn at Narrow-water Castle (R.Ll.P.), B.N.F.C. Excursion, I.N. 1893.

L. hispidum L. The specimen which apparently represents this species in Dr. Moore's set of Derry plants in Dublin Museum is a hispid form of *L. autumnale*, and as the species has not been found by any other botanist on the well-searched fields of Magilligan, its right to a place in our flora is very doubtful.

***L. autumnalis* L.** To 2310 feet in the Mournes, Hart R.I.A.

***L. taraxacum* L.** To 1000 feet in the Mournes, S. & P.

var. ***δ. L. palustre* Smith.**

Antrim—Cushendun, R.Ll.P.

***Tragopogon porrifolius* L.** Is still abundant at Macedon, Sydenham, and Knock, and has spread to railway bank at the Kinnegar at Holywood, where it has been abundant for the last two years (R.Ll.P.); may fairly be considered naturalized in the district.

***Crepis biennis* L.**

Down—Meadows between Crossgar and Downpatrick, R.Ll.P. Is still steadily increasing in the district, and may rank as naturalised.

***C. virens* L.** To 1200 feet in the Mournes, S. & P.

C. paludosa (L.) Moench.

Down—Ballymacormick Point, a few feet above sea-level, R.L.P.

Antrim—Stoneyford, Shane's Castle, and abundant in the glens along the coast, R.L.P.

Derry—By the Roe, Mrs. Leebody. Kilrea and Garvagh, R.L.P.

Hieracium anglicum Fr. 200-2000 feet in the Mourne, S. & P.

Down—The most abundant hawkweed in the Mourne, S. & P.

Antrim—Fair Head and Giant's Causeway, Shoolbred *I.N.* Rocks north of Ballycastle, S.A.S.

var. **b. acutifolium** Backh.

Down—Luke's Mountain at 1000 feet, and by the Shimna River above Tollymore Park, S. & P.

var. **d. longibracteatum** Hanb.

Antrim—Garron Point and Glenariff, W. A. Shoolbred; S.A.S., *I.N.* 1894.

H. iricum Fr.

Derry—Basaltic cliffs, Downhill, R.L.P.

H. flocculosum Backh.

Down—By Spinkwee River at 800 feet (not 1500 feet, as given in *Flora*), and by the same stream on shady rocks in Tollymore Park, S. & P.

Antrim—Sallagh Braes, S.A.S.

H. Leyi Hanb.

Antrim—Benevenagh, W. A. Shoolbred; S.A.S., *I.N.* 1894 (as *H. bifidum* Tausch).

H. Schmidtii Tausch.

Down—Granite cliffs of Bencrom, S. & P.

The Antrim and Derry localities, published in *Flora* for *H. pallidum*, have been mostly transferred to *H. euprepes*; the remainder are doubtful.

H. lasiophyllum Koch. The Ballycastle record has been transferred to *H. anglicum*.

H. Farrense Hanb.

Antrim—Sallagh Braes, S.A.S.; R.L.P., *B.N.F.C.* 1892-3.

H. rubicundum Hanb.

Antrim—Sallagh Braes, S.A.S.; R.L.P., *B.N.F.C.* 1892-3.

H. argenteum Fr. 100-1700 feet in the Mournes, S. & P.

Down—Cove Mountain, Bencrom, Slieve Donard, and Tollymore Park, S. & P.

The *H. argenteum* of *Flora* is transferred to *H. hibernicum*.

H. Sommerfeltii Lindeb.

Derry—Benevenagh, S.A.S.

H. hibernicum Hanb.

Down—Mountain stream in the Mourne Mountains near Rostrevor, H. C. Hart. *Journ. Bot.* 1886 (as *H. argenteum* Fr.). Refound on rocks at Broughnamaddy (the same station), S. & P.

H. stenolepis Lindeb.

Antrim—Cave Hill, R.L.P., and plentiful on Knockagh and Sallagh Braes, S.A.S. ; R.L.P., *B.N.F.C.* 1890-1. Garron Point, W. A. Shoolbred ; S.A.S., *I.N.* 1894. Glenariff, Shoolbred *I.N.*

Derry—Benevenagh, Shoolbred *I.N.*

H. murorum L. pt.

Down—Very rare in the Mournes ; found only by the Bann, S. & P.

Antrim—Garron Point, Shoolbred *I.N.*

var. m. **pachyphyllum** Purchas.

Antrim—Basaltic cliffs of Knockagh and Sallagh Braes, S.A.S. ; W. H. Purchas, *Journ. Bot.* 1895.

H. euprepes Hanb.

Antrim—Cave Hill, Dr. Mateer, 1845, Herb. Hanbury. Sallagh Braes, S.A.S. ; R.L.P., *B.N.F.C.* 1892-3. Bank at Milltown near Red Bay, W. A. Shoolbred ; S.A.S., *I.N.* 1894.

Derry—Benevenagh, S.A.S.

H. caesium Fr.

Antrim—Glenariff (S.A.S.), *B.N.F.C.* 1889-90.

H. vulgatum Fr.

Down—Blue Lough, Hare's Gap, Slieve Muck North, S. & P.

H. sclaphilum Uecht.

Down—Saintfield, D. Redmond.

H. gothicum (Fr. pt.) Backh. (*H. Friesii* Hartm.).

Antrim—Riverbanks in Glendun, Shoolbred *I.N.*

var. **Stewartii** Hanb. 350-950 feet, S. & P.

Down—Several spots by the Bann above Hilltown, and sparingly in Tollymore Park, S. & P. (as *H. Friesii*, Hartm.). It grows along the course of the Bann for about three miles.

H. corymbosum Fr.

Antrim—Riverbanks in Glendun, Shoolbred *I.N.*

H. auratum Fries. 150-1500 feet in the Mourne, S. & P.

Down—The most abundant accipitrine Hawkweed in the Mourne, S. & P.

Antrim—Lough Neagh shore at Cranfield, S.A.S., and sea-cliffs at Cushendun, R.L.P.; R.L.P., *B.N.F.C.* 1892-3. Several places in Glendun, Shoolbred *I.N.*

H. crocatum Fr.

Down—By the Shimna River, and on Pigeon Rock Mountain, S. & P.

Antrim—Milltown near Redbay, and Glendun, Shoolbred *I.N.*

H. boreale Fr.

Down—Abundant by the Shimna River above Tollymore Park, S. & P. (as *H. commutatum*, Beck.).

CAMPANULACEÆ.

Lobelia Dortmanna L. 330-1350 feet in the Mourne, S. & P. There is no lake at 1500 feet, the elevation given by Hart, *R.I.A.*

Down—Lough Shannagh and Altnadua Lake, S. & P.

Antrim—Abundant in a lakelet on summit of Binnagee near Carnlough, at 1000 feet, R.L.P., *B.N.F.C.* 1890-1.

Jasione montana L. To 1500 feet in the Mourne, S. & P.

Campanula rapunculoides L.

Down—Fields near Rostrevor and north of Newcastle, S. & P.

Antrim—In a sandpit near Broughshane, R.L.P.

Derry—Common in a field near Kilrea, R.L.P.

Has persisted in the sandy land near Newcastle for over 20 years, and is naturalized at least here.

C. rotundifolia L. To 2450 feet on the Mourne, Hart *R.I.A.*

ERICACEÆ.

Arctostaphylos uva-ursi (L.) Spreng. Dr. Dickie's Slieve Donard plant was no doubt *Vaccinium vitis-idaea*, S. & P.

***Erica tetralix* L.** To 2055 feet on the Mourne, S. & P.

***E. cinerea* L.** To 2440 feet on the Mourne, S. & P.

***Vaccinium vitis-idaea* L.** 1500-2796 feet on the Mourne, S. & P.
200-2000 feet in Derry.

Down—On most of the Mourne summits, S. & P.

Antrim—Among the rocks of Agnew's Hill, 1804, Templeton MSS.
Head of Glenariff, S. A. Brennan. Near Cranny Lough west of
Carnlough, R.L.P.

Derry—Bank by the roadside between Kilrea and Garvagh, at 200 feet
elevation, R.L.P., *Journ. Bot.* 1894. Summit of Mullaghclogher,
R.L.P.

***V. oxycoccus* L.**

Down—Marsh at Saul Camp near Downpatrick, R.L.P., *B.N.F.C.* 1892-3.

Antrim—Lakelet N.W. of Carnlough, at 1000 feet, R.L.P., *B.N.F.C.*
1892-3 Evisn above Glenariff, S. A. Brennan. Abundant on the
extensive bogs above Dunloy and Rasharkin, R.L.P.

Derry—Bog on margin of Lough Ouske in the Sperrin Mountains,
R.L.P., *B.N.F.C.* 1892-3.

***Pyrola media* Swartz.**

Down—Still abundant on Conlig Hill.

Antrim—Near Cairn Hill and Irish Hill, W. Macmillan. Rocky thicket
between Kilrea and Garvagh, Miss Knowles.

***P. minor* L.**

Down—Between the Barbican gate and the sawmill in Tollymore Park,
H.W.L.

Antrim—Refound in Glenariff, S. A. Brennan.

P. secunda L. Though carefully searched for at Errigal Banks by Mrs.
Leebody, Miss Knowles, and R.L.P., this rare plant has not been
refound, though *P. media* and *P. minor*, recorded from the same place by
Dr. Moore, are still abundant there. Neither has it been refound in any
of the other stations given by Dr. Moore; yet the specimens (or rather
some of them) preserved in Dr. Moore's herbarium are undoubtedly
P. secunda.

AQUIFOLIACEÆ.

Ilex aquifolium L. To 1050 feet in the Mournes, Hart *R.I.A.*

OLEACEÆ.

Fraxinus excelsior L. To 1000 feet in the Mournes, S. & P.

GENTIANACEÆ.

Erythræa centaureum (Curt.) Pers. var. *b. capitata* (Koch).

Antrim—Sand-banks near Giant's Causeway, Shoolbred *I.N.*

Gentiana amarella L. The specimen which apparently represents this species in Dr. Moore's Derry herbarium is *G. campestris*. *G. amarella* has not been found in the district by any recent botanist.

G. campestris L.

Down—Spelga Mountain near Rostrevor, and by the Causeway water, S. & P. Ballykinler, and still on the Kinnegar at Holywood, R.L.P.

Antrim—Frequent throughout the county. Many localities might be added to the list already published.

Derry—Eskers south of Kilrea, R.L.P.

Menyanthes trifoliata L. To 1600 feet in the Mournes, S. & P.

CONVOLVULACEÆ.

Convolvulus arvensis L.

Down—Rostrevor, Killowen, Kilkeel, Newcastle, S. & P. Killough Bay (R.L.P.) *B.N.F.C.* 1892-3. Abundant on the coast near Millisle, J. H. Davies. Queen's Island, Newtownards, Ballydugan Lake, R.L.P.

Antrim—Along the railway from Belfast to Larne, where it has come with ballast, which is obtained on the Curran, where the plant grows abundantly, R.L.P.

Derry—Ballykelly, Mrs. Leebody. Bann mouth and Limavady Junction, R.L.P.

BORAGINACEÆ.

Cynoglossum officinale L.

Down—Abundant on shore at Killowen, rising to 500 feet on the adjoining stony slopes of Spelga Mountain, S. & P.

[*Borago officinalis* L.]

Antrim—Sandhills at White Park Bay, away from any houses, W. J. Knowles.]

***Anchusa sempervirens* L.**

Down—Between Dundonald and Comber, R.Ll.P.

Antrim—Ballyrobert, Parish of Shankill, Herb. D.M. Cullybackey, probably escaped, Miss Knowles. Oldstone near Antrim, W. S. Smith.

***Symphytum officinale* L.**

Down—Near Hilltown and Newcastle, S. & P. Queen's Island, Knocknagoney, Ballynahinch, R.Ll.P.

Antrim—Portrush, Dunseverick, and about Portballantrae, R.Ll.P.

Derry—Magilligan, Mrs. Leebody. Kilrea, R.Ll.P.

***S. tuberosum* L.** Rev. G. Robinson's station is among the woods close to Clandeboye House, where the plant grows abundantly, and appears quite naturalized, though it probably originated in the garden there, R.Ll.P.

***Echium vulgare* L.**

Down—Abundant in a field near Wood House, Rostrevor, S. & P. Kirkiston, C.H.W. On the railway at Ballymacarrett Junction, casual, R.Ll.P.

Antrim—Magheramorne, probably casual, R.Ll.P.

***Mertensia maritima* (L.) Don.**

Down—Extending for nearly a mile along the shingly beach at Glasdrumman south of Newcastle, S. & P. This is Templeton's station.

Derry—Between Portrush and Portstewart, Mrs. Leebody.

This last is the locality mentioned by Sampson (*Statistical Survey of the County of Londonderry*, 1802) when he speaks of the "oyster plant" as growing "on the shore at Ballyaghan . . . on the gravel, close to the sea" and is an interesting confirmation of an old record not mentioned in *Flora*.

***Lithospermum arvense* L.**

Antrim—Brickfield near Saltwater Bridge, Belfast, Dr. J. L. Drummond, 1820; Belfast Museum Herb. This station is long since built over, and become part of the city.

***Myosotis palustris* With.**

Down—Near Rostrevor and Newcastle, rare in the Mourne, S. & P. Ballynahinch and Loughinisland, R.Ll.P.

Antrim—Bush River and Crumlin Waterfoot, R.Ll.P.

The Slieve Donard station of *Flora* belongs to *M. repens*.

var. b. **strigulosa** Reichb.

Antrim—Cushendun, Shoolbred *I.N.*

M. repens Don. To 1000 feet in the Mourne, S. & P.

Down—Abundant on the flanks of the mountains and low grounds of Mourne, S. & P. Crossgar, R.Ll.P.

Derry—Near Upperlands, R.Ll.P.

M. collina Hoffm.

Down—Kirkiston, C.H.W.

Antrim—Gravelly banks at mouth of Sixmile River, R.Ll.P., *B.N.F.C.* 1892-3.

Derry—Portstewart, Miss Davies, *B.N.F.C.* 1889-90.

SOLANACEÆ.

Solanum dulcamara L.

Down—Glasdrumman near Annalong, S. & P. Hedges between Killough and Ardglass, C.H.W. Grey Point and Ballynahinch, R.Ll.P.

Antrim—Ballycastle, R. Welch. Near Ballymena, Miss Knowles.

Derry—Dungiven, and by the Foyle, Mrs. Leebody.

Hyoscyamus niger L.

Down—Plentiful on distillery rubbish at Comber, imported with seed, S.A.S., *I.N.* 1894.

Antrim—A few plants at Glenmore near Lisburn in 1890, but not found since, J. H. Davies. Carnlough, casual, Rev. J. Hall. Still about Ballycastle, R.Ll.P.

OROBANCHACEÆ.

Orobanche rubra Sm.

Antrim—"Gathered near Ballycastle, Oct. 1797," R. Brown (as *O. major*). Kinbane Head, R.Ll.P.

Derry—Castlerock, R.Ll.P.

[**O. minor** Sm.

Down—Abundant in a field by the sea at Craigavad. 1892, H. C. Marshall; R.Ll.P., *B.N.F.C.* 1892-3. Also in 1893, H. C. Marshall. No doubt introduced with seed, along with the Lucerne on which it grows, but in view of the spread of this species in Ireland, its behaviour should be watched.]

***Lathræa squamaria* L.**

Antrim—At Whitehall near Broughshane, on Plum, S. A. Brennan.

Derry—Bellarena, Mrs. Leebody.

SCROPHULARIACEÆ.***Verbascum thapsus* L.**

Down—Stony beach north of Killowen, S. & P. Disused gravel-pit near Lambeg, J. H. Davies. Hillsborough demesne, and on walls and waste ground at Downpatrick, R.L.P.

Antrim—Shore of Lough Neagh in Glenavy Parish, Herb. D. M.

Derry—Dungiven and Limavady, Mrs. Leebody.

[*Erinus alpinus* L.

Down—Growing freely on the wall of the gaol at Downpatrick, 1890, R.L.P., *B.N.F.C.* 1892-93; and still there. A south European plant, now established in the North of England, but apparently not previously noticed in Ireland.]

***Digitalis purpurea* L.** To 1400 feet in the Mourne, S. & P.

***Linaria repens* Ait.**

Down—Abundantly in fields, on banks, by roadsides, and seashore at Killowen, and thence to Seafield; first noticed here by R.L.P. in June, 1884, S. & P.

***L. vulgaris* Mill.**

Down—Crossgar, Killyleagh, Loughinisland, Killinchy, Newry, R.L.P.

Antrim—Ram's Island, Broughshane, Dunloy, Dervock, Ballycastle, R.L.P. Near Doagh, Rev. W. S. Smith.

The Killowen record under this name belongs to *L. repens*.

***Scrophularia aquatica* L.**

Between Warrenpoint Church and Gasworks, S. & P. Sparingly b Castlewella Lake, S.A.S.

Derry—By the Bann at Coleraine, Mrs. Leebody. Dr. Moore's note "Very common in the county" is certainly an error; the above is the only station we know of.

***Melampyrum pratense* L.** 100-1400 feet in the Mourne, S. & P.

Down—Sparingly on cliffs of Eagle Mountain, S. & P. The Mourne records of *Flora* probably belong to var. *montanum*, excepting Tollymore Park, where the type grows abundantly.

Antrim—Shane's Castle, W. D. Donnan. Runabay Head, Carnlough, rocks near Lough Naroon, and heath above Rasharkin, R.L.P.

Derry—Bog near Portglenone, Miss Knowles. Wood near Kilrea, R.L.P.

var. b. **latifolium** Syme.

Antrim—In the glens, Shoolbred *I.N.*

var. c. **M. montanum** Johnst. 1400-2394 feet in the Mourne, S. & P.

Down—Many places in the Mourne, S. & P.

Antrim—In the glens, Shoolbred *I.N.* On Knocklayd at 1500 feet, R.L.P.

M. sylvaticum L.

Antrim—Glenoe, 1837, Herb. D.M.

Thompson's Tollymore Park plant was no doubt a form of *M. pratense*, S. & P.

Mimulus luteus L.

Down—Edge of Clandeboy Lake, R.L.P.

Thoroughly naturalized in the district.

Rhinanthus crista-galli L. To 1000 feet in the Mourne, S. & P. 1690 feet in Antrim (summit of Knocklayd), R.L.P.

Bartsia odontites Huds. var. b. **serotina** (Reichb.)

Antrim—Giant's Causeway, Shoolbred *I.N.*

Euphrasia officinalis L. To 2300 feet in the Mourne, S. & P.

var. b. **E. gracilis**, Fries.

Down—By Bloody Bridge River, S.A.S.

Antrim—Between Ballyearth and Ballintoy, Shoolbred *I.N.* Basalt debris on Knockagh, S.A.S.

Veronica scutellata L.

Down—A number of stations in the Mourne, S. & P. Magheralin, C.H.W. Dundonald, Conlig, Downpatrick, R.L.P.

Antrim—Refound on Rathlin, R.L.P., *B.N.F.C.* 1889-90. Ballycastle, Killagan, above Lisburn, and near Seawt Hill, R.L.P.

Derry—Enagh Lough, Mrs. Leebody. Kilrea, R.L.P.

V. anagallis L.

Down—Lisnacree, Narrow-water, White Water, S. & P. Ballynahinch, C.H.W. Newtownards and Killinchy, R.L.P.

Antrim—Lisburn, Stoneyford, Doagh, Crumlin, Shane's Castle, R.L.P.

Derry—Bellarena, Mrs. Leebody. Coleraine, R.L.P.

V. montana L.

Down—Saintfield, C.H.W. Downpatrick, R.Ll.P.

Antrim—Glendun, S. A. Brennan. Shaw's Bridge, Langford Lodge, Bushmills, R.Ll.P.

Derry—Bellarena and Prehen, Mrs. Leebody. Kilrea, R.Ll.P.

V. serpyllifolia L. To 1000 feet in the Mourne, S. & P.**V. polita** Fr.

Down—Frequent in Mourne district, S. & P. Cultra, R.Ll.P.

Antrim—Bushmills, S.A.S., *I.N.* 1894.

Derry—Coleraine, Mrs. Leebody. Kilrea and Castlerock, R.Ll.P.

V. Buxbaumii Ten.

Down—Rostrevor, Killowen, Greencastle, S. & P. Dundrum, C.H.W. Kilmore near Crossgar. H.W.L. Millisle, R.Ll.P.

Antrim—Ballymena and Glenariff, Miss Knowles. Rathlin Island, R.Ll.P., *I.N.* 1893.

V. hederifolia L.

Down—Killowen, S. & P. Saul and Newcastle, C.H.W. Craigavad, W. D. Donnan.

Antrim—Rathlin Island, R.Ll.P., *I.N.* 1893. Stoneyford and Islandmagee, R.Ll.P.

LABIATÆ.**[Mentha viridis** L.

Down—Stream by roadside at Saul, C.H.W.]

[M. rotundifolia L.

Down—River-side near Ballynahinch, Richd. Hanna. Near Saul Chapel, and between Newtownards and Comber, R.Ll.P.]

[M. alopecuroides Hull.

Down—Stream by roadside at Saul, C.H.W., *Watson B.E.C.* 1893.]

M. piperita Huds.

Down—Plentiful by the old road between Ballynahinch and Drumaness, Richd. Hanna.

M. sativa L. var. **β. M. rubra** Huds.

Down—Saintfield, C.H.W.

var. **paludosa** (Sole).

Derry—Limavady Junction, Mrs. Leebody ; S.A.S., *I.N.* 1894.

M. pulegium L.

Antrim—Abundant in a damp meadow near the north end of Lough Beg, Miss Knowles and R.L.P.

Not now to be found at foot of Tullybranagan Mountain, Down (*Ir. Flor.*), S. & P.

Lycopus europæus L.

Down—Annalong, and Narrow-water demesne, S. & P. Near Crossgar, C.H.W. Portavoe and Killinchy, R.L.P. By Ballyward Lake, S.A.S.

Derry—Upperlands, Kilrea, and near Portglenone, R.L.P.

Origanum vulgare L.

Down—Walls of Templepatrick graveyard, Richd. Hanna.

Derry—Eglinton, Mrs. Leebody.

Thymus serpyllum L. To 2050 feet in the Mourne, Hart *R.I.A.* To 2000 feet, S. & P.

Scutellaria galericulata L.

Down—By canal south of Scarva, H.W.L. and C.H.W. Loughin-island, R.L.P.

Antrim—Glenmore near Lisburn, J. H. Davies. Cushendun, S. A. Brenan. Roadside near Rasharkin, Miss Knowles. Langford Lodge, R.L.P.

Nepeta cataria L.

Down—Abundant by a roadside at Cloughey Bay, C.H.W.

Lamium amplexicaule L.

Down—Kilbroney, Killowen, Knockshee, Greencastle, Annalong, S. & P. Killough Bay (R.L.P.), *B.N.F.C.* 1892-3. Rough Island, Ballywater, Ballykinler, R.L.P.

Antrim—Stoneyford, Broughshane, R.L.P.

Derry—Dungiven, Mrs. Leebody.

L. intermedium Fries. Throughout Down and Antrim. Numerous further stations might be quoted.

L. hybridum Villars.

Down—Killowen, and Glasdrumman near Annalong, S. & P.

Antrim—Carnlough, R.Ll.P.

L. album L.

Down—Kilmore near Crossgar, C.H.W. Loughbrickland, H.W.L.
Narrow-water, R.Ll.P.

Antrim—Broughshane, S. A. Brennan. Magheramorne, R.Ll.P.

Galeopsis speciosa Mill.

Down—Annalong, Hart *R.I.A.* Field at Six-road-ends near Conlig,
S.A.S., *I.N.* 1894.

Antrim—Frequent in sandy cornfields in the neighbourhood of Cushendall. July, 1836, Herb. D. M. Still at Cushendall, R.Ll.P., *B.N.F.C.* 1890-91. Glenariff, Ardclinis, and Cushendun, R.Ll.P., *B.N.F.C.* 1892-3. Breckagh in parish of Skerry, S. A. Brennan.

Derry—Eglinton, and near Enagh Lough, Mrs. Leebody. Half way between Kilrea and Maghera, R.Ll.P.

Stachys betonica (L.) Benth.

Derry—Refound at Kilrea by Mrs. Leebody; S.A.S., *I.N.* 1894. It grows here in some abundance in several pasture fields between the weir and the bridge, R.Ll.P.

S. sylvatica x palustris.

Down—Struell wells near Downpatrick, R.Ll.P.

Antrim—Islandmagee, Herb. D. M. Roadside bank near Belfast, S.A.S., *B.E.C. Report* 1889. Carnlough, and Magheragall near Lisburn, R.Ll.P.

Hybrids nearer *palustris* than *sylvatica* are the prevailing forms in the district. The only station we know for true *S. ambigua* Smith is that of S.A.S. given above, which is near Glenville, on the road from Hannahstown to Woodburne.

S. arvensis L.

Down—In some abundance from Newcastle to Kilkeel, and very abundant at Killowen, S. & P. Fields by shore south of Killough, and between Castlewella and the Factory, S.A.S. Saul, R.Ll.P.

Antrim—Broughshane, and west base of Knocklyd, R.Ll.P.

Ballota alba L.

Down—Near Warrenpoint, S. & P. Ballynahinch, and Ballykinler, R.Ll.P.

Antrim—Near Moira, 1837, Herb. D. M. Brown's Bay on Islandmagee, (R.Ll.P.) *B.N.F.C.* 1892-3. Cushendun, S. A. Brennan. Ballycastle and Bushmills, R.Ll.P.

***Teucrium scorodonia* L.** To 1400 feet in the Mournes, S. & P.

VERBENACEÆ.

[***Verbena officinalis* L.**

Down—Roadside about a mile from Pointzpass on the way to Loughbrickland, H.W.L.; R.Ll.P., *B.N.F.C.* 1892-93.; and still there, H.W.L.]

LENTIBULARIACEÆ.

***Pinguicula vulgaris* L.** To 2000 feet in the Mournes, S. & P.

***P. lusitanica* L.** 0-1600 in the Mournes, S. & P.

Down—A number of stations in the Mournes, S. & P.

Antrim—On moist banks near the Giant's Causeway, Herb. D. M. Glendun, S. A. Brennan. Margins of Lough Naroon, Miss Knowles and R.Ll.P. Cushendall, R.Ll.P.

Derry—"Gathered on a bog by the roadside about half way between Londonderry and Newtownlimavady, Aug. 6th, 1795," R. Brown. Bran Lough above Maghera, R.Ll.P.

***Utricularia vulgaris* L.**

Down—Altnadua Lake, and site of Moneyscalp Lake, S. & P. Brown Bog near Loughbrickland, H.W.L. Lake near Helen's Tower, R.Ll.P.

Antrim—Very fine in clayey holes below the Asylum, Belfast, 1837, Herb. D.M. Portmore, R.Ll.P.

Derry—Lakelets near Kilrea, R.Ll.P.

***U. intermedia* Hayne.**

Antrim—On a large peat-bog near Rasharkin, D.M.; *Cybele Hibernica*. Abundant and fine in a boggy pool about a mile west of Lough Naroon, R.Ll.P.

***U. minor* L.**

Down—Anahilt bog, and bog near the head of Kilkeel River [still there, S. & P.], Templeton MSS. Altnadua Lake, S. & P. Near Crossgar, C.H.W. Pollrimer Lake, S.A.S. Ballydugan Lake, R.Ll.P.

Antrim—In marshes along the shore of Lough Beg, and near Trostan mountain, 1837, Herb. D.M. Bog north of Ballymoney, R.Ll.P.

Derry—Bogs near Maghera, and Garvagh, R.Ll.P.

PRIMULACEÆ.

Hottonia palustris L. "Everogue's Bridge," the original station for this plant, is Crossgar, where it still grows abundantly, R.Ll.P., *B.N.F.C.* 1890-1.

Primula vulgaris L. To 1500 feet in the Mourne, S. & P.

[**P. veris** L.

Antrim—Rare, only found in Glenarm Park, 1837, Herb. D. M. Lambeg, in old pastures, H.W.L.]

Not refound by S. & P. at Rostrevor, the only station in which the authors of *Flora* considered it might be native. "Must be removed from the list of native plants," S.A.S., *I.N.* 1894, in which opinion R.Ll.P. agrees. To show how this plant may be introduced to wild-looking habitats, we may quote the following note by R.Ll.P.:—"Abundant in an old pasture at Cherryvalley near Crumlin. On enquiry it transpired that the stream that waters this meadow passes through a stack-yard in which was stored hay that grew on the lawn at Cherryvalley, where cowslips had been formerly planted, and hence the plant spread to the present station. The cowslips appeared in the meadow the year after the lawn had been cropped for hay."

Lysimachia vulgaris L.

Down—Lakeside at Portavoe, and still at Lough Leagh, R.Ll.P.

L. nummularia L.

Down—Kilmore near Crossgar, C.H.W.

Antrim—Lough Neagh shore at Langford Lodge, R.Ll.P.

Anagallis arvensis L. var. **β. A. cœrulea** Schreb.

Antrim—Bank near the gate of Belfast Botanic Garden, J. J. Andrew; R.Ll.P., *B.N.F.C.* 1890-1.

A. tenella L. To 1600 feet in the Mourne, S. & P.

Down—Frequent in Mourne district, S. & P.

Antrim—Throughout the county, R.Ll.P.

Centunculus minimus L.

Down—Abundant on drained site at Ballymartin Lake, near Annalong, S. & P.

Samolus valerandi L.

Down—Narrow-water demesne and mouth of White Water, S. & P.

Antrim—Shores of Lough Beg, Miss Knowles. Portrush and Dunluce, R.Ll.P.

PLUMBAGINACEÆ.**Statice bahusiensis** Fr.

Down—Many places on both sides of Strangford Lough, R.Ll.P.

Antrim—Abundant at upper end of Larne Lough, R.Ll.P.

PLANTAGINACEÆ.

Plantago lanceolata L. To 1150 feet in the Mourne, S. & P.

P. major L. var. **P. intermedia** Lilib.

Antrim—Plentiful on shore of Lough Neagh at Crumlin waterfoot, S.A.S.

Littorella lacustris L. To 1350 feet in the Mourne, S. & P.; there is no lake at 1500 feet, the elevation given by H. C. Hart, *R.I.A.*

CHENOPODIACEÆ.**Salsola kali** L.

Antrim—Bushfoot, White Park Bay, R.Ll.P.

Derry—Benone, Mrs. Leebody.

Chenopodium bonus-henricus L.

Antrim—Ballee, Miss Knowles. Cullybackey, S. A. Brennan. Clough and Broughshane, H.W.L. Magheragall near Lisburn, R.Ll.P.

Derry—Kilrea, Mrs. Leebody.

Beta maritima L.

Down—Dunynneile Island near Killyleagh (R.Ll.P.), *B.N.F.C.* 1891-2. Portavoe and Millisle, R.Ll.P.; S.A.S., *I.N.* 1894. Newry, R.Ll.P.

Antrim—Maritime rocks from White Park to Derrygregor Head, 1836, Herb. J.M. Refound on Rathlin Island, R.Ll.P., *B.N.F.C.* 1889-90. White Park Bay and Kinbane Head, R.Ll.P.; S.A.S., *I.N.* 1894.

Derry—Downhill, Mrs. Leebody.

Atriplex erecta Huds.

Down—Newcastle, S. & P.

Derry—Bellarena, Mrs. Leebody.

A. deltoidea var. β . **A. salina** Bab.

Derry—Shore near Bellarena, Mrs. Leebody.

A. farinosa Dum.

Down—Shore south of Millisle, and still at Groomsport and Newcastle, R.L.P.

Antrim—Redbay, Cushendun, and Bushfoot, R.L.P., *B.N.F.C.* 1892-3.
Foraff, Miss Knowles.

A. portulacoides L.

Down—Plentiful on sea-shore close to railway bank half a mile north of Dundrum, Richd. Hanna.

This is its most northerly station in Ireland. In its other habitat in our district, near Warrenpoint, it is abundant, and extends from Newry southwards.

POLYGONACEÆ.

Rumex sanguineus L. The type is extremely rare. R.L.P. has observed it for some years by the roadside between Ballycastle and the sea, which is the only station we know of.

R. hydrolapathum Huds.

Down—Loughinisland (R.L.P.), *B.N.F.C.* 1889-90. Ditches on site of Moneyscalp Lake, S. & P. Near Killyleagh (R.L.P.), *B.N.F.C.* 1891-2. Kilmore near Crossgar, C.H.W. Tullymurry, Saul, and Ballydugan, R.L.P.

Antrim—Near Antrim, D. Redmond.

In the Downpatrick marshes it grows in immense abundance, so that in autumn many acres are tinged red and brown with its stems and fruit.

R. acetosa L. 2790 feet in the Mourne, Hart *R.I.A.* 1891.

R. acetosella L. 2790 feet in the Mourne, Hart *R.I.A.* 1891.

Polygonum bistorta L.

Antrim—Shore of Lough Neagh at Langford Lodge, H.W.L.

P. lapathifolium L.

Down—Abundant on shore of Warrenpoint town reservoir, S. & P.

P. maculatum Dyer.

Down—Dundrum, 1894, C.H.W.

P. aviculare L. var. β . **P. littorale** Link.

Down—Sandy shores at Newcastle and Mill Bay, S. & P.

P. Rafi Bab.

Down—Newcastle, S.A.S.; Millisle, R.Ll.P.

Antrim—Redbay and Ballycastle, R.Ll.P.; S.A.S., *I.N.* 1894.

EMPETRACEÆ.

Empetrum nigrum L. 1900-2796 feet in the Mournes, S. & P. 0-1690 feet in Antrim, R.Ll.P.

Antrim—Bogs above Dunloy and Rasharkin, summit of Knocklayd, and at sea-level at Torr, R.Ll.P.

EUPHORBIACEÆ.**Euphorbia exigua** L.

Down—Kilowen, S. & P. Margins of Lough Leagh (R.Ll.P.), *B.N.F.C.* 1891-2. Ballyknowe near Downpatrick (R.Ll.P.), *B.N.F.C.* 1892-3. Conlig, W. D. Donnan. Crossgar and Tullymurphy, R.Ll.P.

Antrim—Common about Ballymena, Miss Knowles.

Derry—Kilrea and Ballyscullion, Mrs. Leebody.

Mercurialis perennis L.

Down—In quantity on the "Dane's Cast," close to Scarva House, H.W.L.

Antrim—Still very abundant at Langford Lodge, R.Ll.P.

CERATOPHYLLACEÆ.**Ceratophyllum demersum** L.

Down—Carriekmannan Lake near Saintfield, C.H.W.

CALLITRICHACEÆ.

Callitriche stagnalis Scop. 1320 feet in the Mournes, Hart *R.I.A.*

C. hamulata Kuetz. To 1150 feet in the Mournes, S. & P.

var. **β. C. pedunculata** DC.

Down—Mill-dam near Hilltown, S. & P.

C. autumnalis L.

Down—Castlewellan Lake, Annsboro' Lake, and Long Lough, S.A.S. Derry Lake, R.Ll.P.

Antrim—In Lough Neagh at Portmore, Templeton MSS. Abundant in ditches by the Lagan Canal and shores of Lough Neagh, 1837, Herb. D.M. In the river at Bushfoot, and in the Bann at Toome, R.Ll.P.; S.A.S., *I.N.* 1894.

Derry—Growing in the River Bann a little above the bridge, Templeton MSS. Abundant in canal at Kilrea, R.L.P.

URTICACEÆ.

Parietaria officinalis L.

Down—Tullybranagan near Newcastle, and Killowen, S. & P. Newry and Clough Castle, H.W.L.

Antrim—Kilroot old church, R.L.P.

CANNABINACEÆ.

[**Humulus lupulus** L.

Antrim—Cloghmills, H.W.L.]

AMENTIFERÆ.

Salix pentandra L.

Down—By the Yellow Water in the Mourne, S. & P. Crawfordsburn, Moira, Tullymurphy, R.L.P.

Antrim—Near Templepatrick, S.A.S. Glendun, S. A. Brennan. Lisburn, Stoneyford, Cairncastle, Drumnasole, Ballymena, Killagan, Cape-castle, Bushmills, &c., R.L.P.

Derry—Near the leap of Coleraine, Templeton MSS. Frequent about Draperstown, Kilrea, and Garvagh, R.L.P.

S. triandra L.

Antrim—Found in a hedge about half-way between Malone and the Falls, and in osier grounds near Portmore Park, Templeton MSS.

S. purpurea L.

Down—Moneyscalp, Crotlieve, and Lisnacree, S. & P. Holywood and Craigavad, R.L.P.; S.A.S., *I.N.* 1894. Kilbroney, R.L.P.

Antrim—Whitehead (R.L.P.), *B.N.F.C.* 1890-1. Broughshane, Rasharkin, Capecastle, Kinbane Head, Bushmills, R.L.P.

Derry—Roadsides near Upperlands, and frequent on mountain roads above Draperstown, R.L.P.

S. Smithiana Willd.

Down—Several stations in Mourne district, S. & P. Holywood Hills, Ballywalter, Kilkeel, R.L.P.

Antrim—Portmore, R.L.P.

Derry—Roadsides south of Kilrea, R.L.P.

S. aurita L. To 1500 feet in the Mournes, S. & P.

S. caprea L.

Down—Near Rostrevor, Newcastle, Kilbroney River, and Ghann River, S. & P. Holywood Hills, R.Ll.P.

Antrim—Iisburn, Glenarm, Drumnasole, Runabay Head, Rasharkin, &c. R.Ll.P.

S. repens L. To 2000 feet in the Mournes, S. & P.

S. herbacea L. 1700-2790 feet in the Mournes, S. & P.

Down—On most of the Mourne summits, S. & P.

Derry—Mullasturakeen and Mullaghologher, R.Ll.P.

A Co. Antrim specimen in Herb. D.M. is labelled "Slievenanee" not "Slievenamon," which is no doubt a misprint in *Cybele Hibernica*.

Populus tremula L. To 1200 feet in the Mournes, S. & P.

Down—Cliffs south of Blue Lough, S. & P. On rough ground and railway cuttings south of Crossgar, R.Ll.P.

Antrim—Cliffs of Knockagh and Garron Point, and near source of Braid River, and refound on Rathlin. R.Ll.P.

Derry—Among rocks between Kilrea and Garvagh, R.Ll.P.

Myrica gale L. To 1400 feet in the Mournes, S. & P.

Betula glutinosa Fries. To 1400 feet in the Mournes, S. & P.

Down—Frequent in Mourne Mountains, S. & P.

Antrim—Glenariff, Shoolbred *I.N.* Ram's Island, R.Ll.P.

var. β . **B. pubescens** Ehr.

Antrim—Glenariff and Glendun, Shoolbred *I.N.*

Quercus robur L. To 1300 feet in the Mournes, S. & P.

Corylus avellana L. To 1000 feet in the Mournes, S. & P.

CONIFERÆ.

Taxus baccata L.

Antrim—Rocks in the little Deerpark, Glenarm, and on the Cave Hill, 1836, Herb. D.M. Certainly not now on Cave Hill, S.A.S.

Juniperus nana Willd. To 2000 feet in the Mournes, Hart *R.I.A.*
1000-2000 feet in the Mournes, S. & P.

Down—Local in the Mourne Mountains, S. & P.

Antrim—Refound in Glenariff, R.Ll.P.

Derry—Refound on Benevenagh (R.Ll.P.), *B.N.F.C.* 1892-3.

Juniperus sabina L. Templeton suggests in his MSS. that *Lycopodium alpinum*, "which is named by many people Mountain Savin," was the plant intended by Harris (see *Flora N.E.I.*, p. 301).

HYDROCHARIDACEÆ.

Hydrocharis morsus-ranæ L.

Antrim—Bogholes at Gawley's Gate, $1\frac{1}{2}$ miles west of its Portmore habitat, R.Ll.P., *B.N.F.C.* 1892-3. Introduced at Cushendun by S. A. Brennan.

ORCHIDACEÆ.

Orchis incarnata L.

Down—Near Kilkeel, and by Kilkeel River under Slieve Bingian, S. & P.

Antrim—Stoneyford, Crumlin, and shores of Lough Beg, R.Ll.P.

Derry—Maghera, Kilrea, Garvagh, R.Ll.P.

O. pyramidalis L.

Antrim—Sparingly on chalk rubbish at Magheragall quarries near Lisburn, R.Ll.P., *B.N.F.C.* 1890-1.

Derry—In some abundance at the eastern end of Magilligan strand, Mrs. Leebody; R.Ll.P., *B.N.F.C.* 1892-3.

The single specimen that Dr. Moore found at Magilligan (*Cybele Hibernica*) was no doubt native, and was the first discovery of the species in the district.

Gymnadenia conopsea (L.) R.Br.

Antrim—Glynn, Herb. D.M. Cairncastle and Giant's Causeway, R.Ll.P.

Derry—Between Portstewart and Portrush, R.Ll.P.

G. albida (Swartz) Rich.

Down—Conlig Hill, R.Ll.P.; S.A.S., *I.N.* 1894.

Antrim—On Carrickfergus Commons, and near Ballycastle, Herb. D.M. Glenariff, S. A. Brennan, and refound on Squire's Hill by W. H. Patterson; S.A.S., *I.N.* 1894. White Mountain above Lisburn, R.Ll.P.

Habenaria viridis (L.) R.Br.

Down—North of Annalong, and in Kilbroney valley, S. & P. Conlig Hill, R.Ll.P.

Antrim—Glendun, S. A. Brenan. Carnaneigh, Binnagee, Dunloy, Knock-layd, and common about Stoneyford, R.Ll.P.

Derry—Benevenagh, R.Ll.P., *B.N.F.C.* 1892-3. Abundant from Benevenagh to Benbradagh, Mrs. Leebody. Maghera, Kilrea, Garvagh, and near Sconce Hill, R.Ll.P.

H. bifolia R.Br.

Down—North of Annalong, and in the Kilbroney valley, S. & P.

Antrim—Cushendun, S. A. Brenan. Killagan, Causeway headlands, and common about Stoneyford, R.Ll.P.

Derry—Enagh Lough, Mrs. Leebody : S.A.S., *I.N.* 1894. Near Dungen, Mrs. Leebody. Near Kilrea and Sconce Hill, R.Ll.P.

H. chlorantha Bab.

Down—Frequent in the Mourne district, S. & P.

Antrim—Glenariff, Shoolbred *I.N.* Dunloy, Rasharkin, and common about Stoneyford, R.Ll.P.

Derry—Common in north Derry, Mrs. Leebody. Common in the Bann valley, R.Ll.P.

Spiranthes Romanzoviana Cham.

Derry—Near Kilrea, Mrs. Leebody : *I.N.* 1893, and R.Ll.P. in *Journ. Bot.* 1893.

This extremely rare plant, the best addition to the flora of the north-east which we have to record, grows here in some abundance in meadows, which should be described as damp pasture, rather than worn-out bog. It should be looked for in similar situations elsewhere in the Bann valley. The counties of Armagh and Cork are its only other stations in Europe.

Listera cordata (L.) R.Br.

Down—Slieve Bearnagh, Eagle Mountain, Carn Mountain, Slieve Lough Shannagh, S. & P.

Antrim—On the Garron plateau, R.Ll.P.

Derry—Benevenagh, Mrs. Leebody.

Neottia nidus-avis (L.) Rich.

Antrim—Glenariff, (R.Ll.P.), *B.N.F.C.* 1889-90. Whitehall near Broughshane, S. A. Brenan.

Derry—Wood below Benevenagh (Miss Knowles), *B.N.F.C.* 1892-3.

Epipactis latifolia (L.) Swartz.

Down—Dromantine demesne, H.W.L.

Antrim—Near Ballymena, S. A. Brenan.

ALISMACEÆ.**Sagittaria sagittifolia** L.

Antrim—Crumlin Waterfoot, R.L.P.

Butomus umbellatus L.

Down—Still at Lough Leagh, (R.L.P.), *B.N.F.C.* 1891 2.

Antrim—Mouth of Six-mile water, W. S. Smith. Crumlin waterfoot, Miss Knowles. Recently introduced at Langford Lodge from the Lagan, S.A.S.

LILIACEÆ.**Scilla verna** L.

Down—Abundant Ardglass to Killough, R.L.P.

Antrim—Still abundant on Rathlin, R.L.P., *B.N.F.C.* 1889-90.

Allium ursinum L.

Down—Mourne Park, Bloody Bridge, Tollymore Park, S. & P. Dundonald and Downpatrick, R.L.P.

Derry—West of Downhill, Mrs. Leebody.

JUNCACEÆ.**Juncus maritimus** Sm.

Antrim—Springly at the Giant's Causeway, Herb. D.M.

J. effusus L. To 1837 feet in the Mournes, S. & P.

J. glaucus (Huds.) Ehr.

Down—Waste ground behind Queen's Island Shipyard, W. D. Donnan.

Antrim—Cushendun, S. A. Brenan. Ballycarry, Glynn, Langford Lodge, R.L.P.

J. obtusiflorus Ehr.

Down—Marshy places on the Downs at Ardglass, C.H.W. Refound at Dundrum Bay, by the railway $\frac{3}{4}$ mile north of Dundrum, S.A.S.

J. acutiflorus Ehr. To 1900 feet in the Mournes, S. & P.

J. supinus Moench. To 2000 feet in the Mournes, S. & P.

Down—Frequent in the Mournes. A submersed very slender form, many feet in length, grows in the lakes and streams in up to 4 feet

of water, S. & P. Aughnadunagh Lake near Saintfield (approaching var. *subverticillatus*), C.H.W., *Watson B.E.C.* 1893.

Antrim—Slatt, Ballee, and Gleuariff, Miss Knowles. Bogs near Rasharkin and Dervock, R.Ll.P.

Derry—Limavady, Mrs. Leebody. Common about Maghera, Kilrea, Garvagh, and Coleraine, R.Ll.P.

J. squarrosus L. To 2510 feet in the Mourne, S. & P.

TYPHACEÆ.

Typha latifolia L.

Down—Site of Moneysclop Lake, Warrenpoint town reservoir, Narrow-water demesne, S. & P. Meenan Bog near Loughbrickland, H.W.L. Bangor, Portavoe, Seaforde, Loughinisland, R.Ll.P.

Antrim—Bush River, R.Ll.P.

Derry—Drains at Ballyscullion, Mrs. Leebody.

T. angustifolia L.

Down—In Lough Neagh at mouth of Lagan Canal, R.Ll.P., *B.N.F.C.* 1892-3. Still abundant in Lough Henney, C.H.W. Abundant in Derry Lough near Ballynahinch, S.A.S.

Sparganium ramosum Huds. var. *b. microcarpum* Neuman.

Down—Loughinisland, C.H.W.

S. simplex Huds.

Down—Near Kilkeel, Newcastle, and Warrenpoint, S. & P. Loughinisland (R.Ll.P.), *B.N.F.C.* 1889-90. Moira, C.H.W. Comber, R.Ll.P.

Antrim—Bush River, R.Ll.P.

Derry—Kilrea, Mrs. Leebody. Near Portglenone, R.Ll.P.

S. natans L.

Down—Altnadua Lake, S. & P.

Antrim—In the Lagan, between the first and second locks, R.Ll.P.

S. minimum Fr.

Down—Milltown near Warrenpoint, S. & P. Small lake near Crossgar, C.H.W.

Antrim—Bog-holes west of Scawt Hill, R.Ll.P.; S.A.S., *I.N.* 1894. Near Parkmore, S. A. Brennan.

ARACEÆ.

Acorus calamus L. Quite naturalized throughout the course of the Lagan Canal.

Arum maculatum L. To 1000 feet in the Mourne, S. & P.

POTAMOGETONACEÆ.

Potamogeton polygonifolius Pourr. 1550 feet in the Mourne, Hart *R.I.A.*

P. rufescens Schrad.

Down—Lake (Ballykine Lough), Ballynahinch, R.I.L.P. ; *Watson B.E.C.* 1891-2. Burren River near Newcastle, S. & P.

P. nitens Weber.

Down—Annsboro Lake, S.A.S., *I.N.* 1894.

Antrim—Six-mile water near Antrim, S.A.S., *I.N.* 1894.

P. lucens L.

Derry—Magilligan, Mrs. Leebody.

var. *c. longifolius* Gay.

Antrim—Washed ashore at Crumlin Waterfoot, S.A.S.

P. undulatus Wolfg. (= *P. perfoliatus* x *crispus*).

Antrim—In the Six-mile River above Templepatrick, S.A.S., 1882-94.
An infertile hybrid which grows in abundance at junction with Dagh River and other places, *vide* Bennett, *Journ. Bot.* 1894, and S.A.S., *I.N.* 1894.

P. Zizii Roth.

Down—Lagan Canal near Blaris, S.A.S.

Antrim—Lough Neagh at Cranfield, S.A.S.

Derry—Bann at Kilrea, Mrs. Leebody.

P. obtusifolius M. & K.

Down—Loughinisland, R.I.L.P.

Derry—Killelagh Lake above Maghera, R.I.L.P.

P. pectinatus L.

Down—Clandeboy Lakes, R.I.L.P.

Antrim—Quarry pools at Magheragall near Lisburn, R.I.L.P.

Derry—Eglinton, Mrs. Leebody.

***Ruppia maritima* L.**

Derry—Carrickhue, Mrs. Leebody.

***R. rostellata* Koch.**

Down—Stream at Blackstaff Bridge near Kirkcubbin, R.Ll.P.

***Zannichellia palustris* L.**

Down—Stream at Blackstaff Bridge near Kirkcubbin, R.Ll.P.

Derry—Common in the Bann from Coleraine to the sea, R.Ll.P.

CYPERACEÆ.***Schoenus nigricans* L.** To 1800 feet in the Mourne, S. & P.

Antrim—Lough Naroan, R.Ll.P.

***Cladium mariscus* (L.) R.Br.**

Down—Sparingly on northern margin of Altnadua Lake near Castlewellan, S. & P. This is no doubt Templeton's station, the location of which is discussed in *Flora*; the plant was thought to be extinct in N.E. Ireland.

Antrim—In Lough Neagh at Portmore, Templeton MSS. Appears to be now extinct at Lough Neagh.

***Rhynchospora alba* (L.) Vahl.** 350-1225 feet in the Mourne, S. & P.

Down—Pools by Kilkeel River under Slieve Bingian; near Colligan Bridge; base of Slieve-na-brock; and near Cove Mountain, S. & P.

Antrim—"With ripe seeds gathered in a bog near Ballycastle, 1797," R. Brown. Bogs around Ballymoney [still there, R.Ll.P.], and frequent in flow bogs in the north of the county, Herb. D.M.

var. *β. sordida*.

Antrim—Bog near Ballymena, Miss Knowles.

***Eleocharis acicularis* (L.) Sm.**

Down—Shores of Lough Neagh at Anadroghal, H.W.L.

Derry—Lough Neagh near Toome, and abundant in the centre of Lough Beg, R.Ll.P., *Journ. Bot.* 1893. The plant appears to grow everywhere on the sandy bottom of Lough Beg in up to four feet of water, and over an area of several square miles. This submerged form has short, straight stems, and is always barren, R.Ll.P. (See *Journ. Bot.* 1893.)

***Scirpus maritimus* L.**

Down—Mill Bay and above Warrenpoint, S. & P.

S. sylvaticus L.

Down—Tollymore Park, S. & P. Ballydugan Lake and near Killyleagh, R.Ll.P.

Antrim—Broughshane, and by the Bann occasionally, R.Ll.P.

Derry—In several places by the Bann, Mrs. Leebody and R.Ll.P.

S. lacustris L.

Down—Ballydugan and Killyleagh, R.Ll.P.

Antrim—Near Broughshane, Herb. Canon Grainger. Several places in Main River, Miss Knowles and R.Ll.P. Rathlin Island, R.Ll.P.

S. Tabernæmontani Gm.

Derry—Near Culmore, Mrs. Leebody.

S. pauciflorus Lightf.

Down—Between Dunny Water Bridge and Annalong, Hart *R.I.A.*

Antrim—Rathlin Island, S.A.S.

Derry—Sandy shore of the Bann near its mouth, R.Ll.P.

S. fluitans L.

Down—Hilltown, Shimna River, Narrow-water demesne, S. & P. Holywood Hills, R.Ll.P.

Antrim—Causeway Headlands, R.Ll.P.

S. setaceus L.

Down—Tollymore Park, and source of Kilbroney River, S. & P. Saintfield, C.H.W. Carnagaver and Ballynahinch, R.Ll.P.

Antrim—Glennie, Herb. D.M. Near Fair Head, and between Ballycastle and Ballintoy, Shoolbred *I.N.* Bushfoot, R.Ll.P.

Derry—Limavady and Enagh Lough, Mrs. Leebody. Garvagh, R.Ll.P.

S. Savii S. & M. 820 feet in the Mourne, Hart *R.I.A.*

Down—Glasdrumman, Dunny Water Bridge, White Water, Kilkeel, Narrow-water, S. & P. Victoria Park, R.Ll.P.

Derry—Castlerock, R.Ll.P.

Blysmus rufus (Huds.) Link.

Down—Grey Point, and abundant from Kilclief to Strangford, R.Ll.P.

Eriophorum polystachion L. var. *γ. elatius* Koch.

Antrim—Bogs at Slatt and Ballee near Ballymena, Miss Knowles. Fine specimens, over 3 feet in height.

Carex dioica L.

Antrim—Abundant through the parish of Ramoan, Herb. D.M.

C. pauciflora Lightf.

Antrim—Bog above Glenariff, 1889, H.W.L. An interesting and welcome addition to the Irish flora.

C. disticha Huds.

Down—Near Crossgar, C.H.W.

Antrim—Salt marshes by Larne Lough, Herb. D.M. Rathlin Island, R.Ll.P., *I.N.* 1893. Common where the Bann leaves Lough Beg, R.Ll.P.

C. arenaria L.

Antrim—Cushendun, White Park Bay, Bushfoot, Portrush, R.Ll.P.

C. vulpina L.

Down—Mill Bay and Narrow-water, S. & P. Ardglass (R.Ll.P.), *B.N.F.C.* 1892-3. Holywood and Sketrick, R.Ll.P.

Antrim—Frequent along the shores of Islandmagee, Herb. D.M. Whitehead, H.W.L.

Derry—Eglinton, Mrs. Leebody. Bann mouth, R.Ll.P.

C. muricata L.

Antrim—Marshy pasture between Springfield Road and the Forth River above Clowney Bridge, Richd. Hanna; *S.A.S.*, *I.N.* 1894.

C. teretiuscula Good.

Derry—Abundant on marshy margin of Killelagh Lough above Maghera, Mrs. Leebody and R.Ll.P. This plant was believed to be extinct in the district.

C. paniculata L.

Antrim—Grange of Killagan, and Parish of Aghagallon, Herb. D.M. Near Muckamore, *B.N.F.C.*; *I.N.* 1893. Ram's Island, H.W.L. Portmore Lake, R.Ll.P.

Derry—Kilrea, Mrs. Leebody.

C. canescens L.

Down—Carngaver, R.Ll.P.

Antrim—Killagan, and bogs above Dunloy and Rasharkin, R.Ll.P.

Derry—Near Kilrea, Mrs. Leebody.

C. leporina L.

Down—Sparingly on the lower grounds of Mourne district; abundant around Lough Island Reavy, S. & P. Aghaderg, H.W.L. Victoria Park, W. D. Donnan. Conlig, Killinchy, Downpatrick, R.Ll.P.

Antrim—Ballee and Cullybackey, Miss Knowles. Killagan and Dunloy, R.Ll.P.

Derry—Kilrea, Mrs. Leebody.

C. stricta Good.

Antrim—Side of Lough Neagh at Shane's Castle, Herb. D.M. Abundant and luxuriant on several spots around Portmore Lough, and islet on Antrim side of Lough Beg, R.Ll.P.; S.A.S., *I.N.* 1894. Frequent where the Bann leaves Lough Beg, and again half-way to Portglenone, and abundant on the river edge for half-a-mile at Portglenone House, R.Ll.P.

Derry—Side of the Bann near Coleraine, Herb. D.M. [Still there, below the town, R.Ll.P.] Side of the Bann below Toome, R.Ll.P.; S.A.S., *I.N.* 1894. By the Bann at Kilrea, Mrs. Leebody.

This plant, for which in *Flora* only Templeton's notes could be quoted, is thus abundantly restored to its place in our flora.

C. acuta L.

Antrim—Banks of the River Main, near Ballandraid, Herb. D.M.

C. rigida Good. Dr. Dickie's record, "Summit of Slieve Donard," was certainly an error, S. & P.

C. aquatilis Wahl. var. **elatior** Bab.

Antrim—Ditch by the Main River in Shane's Castle Park, R.Ll.P., *Journ. Bot.* 1892. See also A. Bennett in *I.N.* 1892.

C. Goodenovii Gay. To 1450 feet in the Mourne, Hart *R.I.A.*; to 1400 feet, S. & P.

C. pallescens L.

Down—Tollymore Park, S. & P. Dundrum and Saintfield, C.H.W. Aghaderg, H.W.L.

Derry—Kilrea, R.Ll.P.

C. limosa L.

Down—Plentiful in a wet marsh on Saul Camp ground at Downpatrick, R.Ll.P., *B.N.F.C.* 1892-3.

Antrim—Bog east of Killagan railway station, margins of Lough Naroon, and still frequent on wet bogs above Rasharkin, R.Ll.P.

Derry—Margins of Lough Ouske in the Sperrin Mountains, R.Ll.P.
Journ. Bot. 1892.

C. strigosa Huds.

Antrim—Near Muckamore, B.N.F.C. ; *I.N.* 1893.

C. pendula Huds.

Antrim—Glenariff, Shoolbred *I.N.* Langford Lodge, H.W.L. Woodburn Glen, R.Ll.P.

C. præcox Jacq.

Antrim—Rathlin Island, R.Ll.P., *B.N.F.C.* 1889-90.

Derry—Near Bellarena, Mrs. Leebody. Kilrea, R.Ll.P.

C. pilulifera L.

Antrim—Glenariff, Shoolbred *I.N.*

C. glauca Scop. To 2510 feet in the Mourne, S. & P.

C. æderi, *auct. plur.*

Down—Aughnadarragh Lake, C.H.W. ; *Watson B.E.C.* 1893-4. By Pollrømer Lake, S.A.S.

C. extensa Good.

Down—By the Quoile below Downpatrick, R.Ll.P.

Derry—Coleraine, Mrs. Leebody. Bann mouth, R.Ll.P.

C. Hornschuchiana Hoppe. To 1700 feet in the Mourne, S. & P.

Down—Between Dunny Water Bridge and Annalong, Hart *R.I.A.*
 Frequent on the Mourne, S. & P. Carngaver, R.Ll.P.

Antrim—Glenshesk, bogs above Agnew's Hill, and head of Glenariff,
 Herb. D.M. Bogs above Dunloy and Rasharkin, R.Ll.P.

Derry—Killelagh Lough above Maghera, and near Kilrea, R.Ll.P.

C. distans L.

Down—South of Rostrevor, S. & P.

Antrim—Below Cushendall, Herb. D.M.

Derry—Near Portstewart, Mrs. Leebody. Bann mouth, R.Ll.P.

C. binervis Sm. To 2394 feet on the Mourne, S. & P.

C. lævigata Sm.

Down—Between Dunny Water Bridge and Annalong, Hart *R.I.A.*
 Mourne Park, S. & P. Kilmore near Crossgar, C.H.W., *Watson B.E.C.* 1893-4.

Derry—Dungiven, Mrs. Leebody.

C. filiformis L.

Antrim—A fine specimen is in Herb. D.M., labelled "At Selchin new deer park, side of Lough Neagh, July, 1832." This plant, which is included among the "Plants erroneously recorded" in *Flora*, must therefore be restored to its place in our flora, though it is feared it is now extinct, through drainage, along with *C. elongata*, which grew at the same place.

C. hirta L.

Down—White Water, S. & P. Aghaderg and Tullylish, H.W.L.
Cultra, R.Ll.P.

Antrim—Shane's Castle, W. D. Donnan. Glenarm, R.Ll.P.

Derry—Maghera, Mrs. Leebody. Bellarena, W. Kennedy. Kilrea, R.Ll.P.

C. rostrata Stokes. To 1150 feet in the Mournes, Hart *R.I.A.*; also S. & P.
var. **β. robusta** Sonder.

Down—Brown Bog near Loughbrickland, H.W.L.

C. vesicaria L.

Down—Pollramer Lake, C.H.W. Brown Bog near Loughbrickland, H.W.L.

Antrim—Cushendall, and abundant by the Bann at Portglenone House, and at its outflow from Lough Beg, R.Ll.P.

Derry—By the Bann at Kilrea, Mrs. Leebody.

C. paludosa Good.

Derry—Side of the River Bann below Coleraine, Herb. D.M.

C. riparia Curt.

Antrim—Still at Portmore, by the Tunny drain, R.Ll.P.

Derry—Abundant in several spots on south bank of Bann, between Coleraine and the sea, R.Ll.P.

GRAMINEÆ.

Anthoxanthum odoratum L. To 2394 feet in the Mournes, S. & P.

Alopecurus pratensis L.

Down—Donaghadee, S.A.S., *I.N.* 1894.

Antrim—Stranmillis, Ballygomartin, and roadside beyond Ligoniel, S.A.S.

Nardus stricta L. To 2449 feet in the Mournes, S. & P.

***Milium effusum* L.**

Down—Wooded shore of lough south of Rostrevor, S. & P. Drumcro and near Magheralin, C.H.W.

Antrim—Collon [Colin] Glen, near the large waterfall, Herb. D.M.

***Phragmites communis* Trin.**

Down—Common in Mourne district, S. & P. Holywood and Newtownards, R.Ll.P.

Antrim—Shane's Castle, wet bogs above Dunloy and Rasharkin, and frequent in Lough Beg, and by the Bann from Lough Beg to the sea in Antrim and Derry, R.Ll.P.

Calamagrostis epigejos Roth. Searched for at Formoyle Hill by Mrs. Leebody in 1893, and by Mrs. Leebody, Miss Knowles, and R.Ll.P. in 1894, without success; apparently extinct there.

***C. Hookeri* Syme.**

Antrim—On the shore of Lough Neagh occasionally all the way from Toome Bridge to Antrim, Herb. D.M.

Coney Island was inadvertently printed in *Flora* for Church Island. Searched for here by R.Ll.P. in 1893, without success; the place is now close-cropped pasture.

***Agrostis canina* L. To 2300 feet on the Mournes, S. & P.**

Down—Common in the Mourne district, S. & P. Ballyalloy, and hills above Dundonald, S.A.S.

Antrim—Mazetown, Castle Upton, and Crumlin Waterfoot, S.A.S.

***A. vulgaris* With. var. β . *A. pumila* Lightf. 1200–1600 feet in the Mournes, S. & P.**

Down—Slieve Bingian and Eagle Mountain, S. & P.

Antrim—Ballycastle, R.Ll.P.

Derry—Benevenagh, R.Ll.P., *B.N.F.C.* 1892-3. Near Maghera and Kilrea, sand-dunes at Bann mouth, and fields at Magilligan, R.Ll.P.

A. alba* L. To 2055 feet on the Mournes, S. & P.**Holcus lanatus* L. To 1350 feet on the Mournes, S. & P.*****H. mollis* L.**

Down—A tall (4 feet) slender form at White Water, S. & P. Castlewellan Park, S.A.S.

Derry—Limavady, Mrs. Leebody. Kilrea, R.Ll.P.

Aira flexuosa L. To 2790 feet on the Mournes, Hart *R.I.A.*, also S. & P.
Down—Common on the Mournes, S. & P. Hills above Dundonald,
S.A.S.

Antrim—Above Dunloy and Rasharkin, R.L.P.

Derry—Benevenagh and Benbradagh, S.A.S. Garvagh, R.L.P.

A. præcox L. To 1662 feet on the Mournes, S. & P.

Trisetum flavescens (L.) Beauv.

Down—Killyleagh (R.L.P.), *B.N.F.C.* 1891-2. Marino, Cultra, New
townards, R.L.P.

Antrim—Plenty near Antrim and Ballinderry, Herb. D.M. Lisburn
Park, Greenisland, Carrickfergus, R.L.P.

Derry—On a wall at Garvagh, R.L.P.

[**Avena fatua** L.

Antrim—Rubbish heaps at Springfield, Belfast, with other casuals,
S.A.S.]

[**A. strigosa** Schreb.

Antrim—Frequent near Clogh Mills, Herb. D.M.]

A. pubescens L.

Down—Shore at Craigavad, R.L.P.; S.A.S., *I.N.* 1894. Holywood,
W. D. Donnan. Not found by S. & P. at Newcastle (Templeton's
station).

Antrim—Cliffs of Cave Hill, and in Parkmore wood, S.A.S.

Trifolium decumbens Beauv.

Derry—Mourne district frequent, S. & P. Near Lough Shark, H.W.L.
and C.H.W.

Antrim—Glenariff, Shoolbred *I.N.* Cushendun, Dunloy, R.L.P.

Derry—Maghera, Kilrea, Garvagh, Bann mouth, R.L.P.

Koeleria cristata (L.) Pers.

Antrim—Dry, sandy ground at Cushendall, Herb. D.M. Still at Giant's
Causeway, and still on Islandmagee, growing 3 feet high at the
Rocking-stone, R.L.P.

Melica uniflora Retz.

Down—Frequent in Mourne district, S. & P. Downpatrick, R.L.P.

Antrim—Glenariff, H.W.L. Carnlough and Shane's Castle, R.L.P.

Derry—Garvagh, Mrs. Leebody. Kilrea, R.L.P.

Molinia caerulea Schreb. To 2449 feet on the Mournes, S. & P.

Antrim—Bogs at Killagan and above Dunloy, R.L.P.

Poa annua L. To 2450 feet on the Mournes, S. & P.

P. pratensis L. To 1350 feet on the Mournes, S. & P. We could not find it on summit of Slieve Donard, whence it is recorded with a ? by Dickie (*Flor. Ulst.*), and apparently copied from this work (but without the ?) into *Cybele Hibernica* and Mr. Hart's *Report*, R.I.A. 1891; and we believe this note to be a mistake.

Glyceria fluitans (L.) R.Br. To 1150 feet in the Mournes, S. & P.

Schlerochloa distans (L.) Bab.

Down—Warrenpoint, S. & P.

S. rigida (L.) Link.

Down—Walls by the sea at Ardglass and Killough, R.L.P., *B.N.F.C.* 1892-93.

Antrim—Wall top at Magheramorne railway station, R.L.P.

S. loliacea (Huds.) Woods.

Down—White Water, and near Newcastle, S. & P. By Ballydugan Lake, R.L.P.

Antrim—Redbay, Cushendun, and still at Ballycastle and Olderfleet, R.L.P.

Briza media L.

Down—Narrow-water, S. & P. Newcastle, C.H.W. Killinchy, R.L.P.

Catabrosa aquatica Beauv.

Down—Saintfield, D. Redmond.

Antrim—Dervock, R.L.P.

Derry—Lignapeiste Glen, Mrs. Leeboddy. Near Upperlands and Maghera, Miss Knowles. Near Garvagh, R.L.P.

Festuca sciuroides Roth.

Down—Near Warrenpoint, S. & P. Rostrevor, H.W.L. Downpatrick, and still at Holywood, R.L.P.

Antrim—Randalstown, W. D. Donnan.

F. ovina L. Type ascends to 1500 feet, and viviparous form ranges from 200 to 2796 feet on the Mournes, S. & P.

var. β . **F. tenuifolia** Sibth.

Down—Cliffs of Slieve Muck, at 1500 feet, S.A.S.

var. *γ. F. duriuscula* L.

Antrim—Frequent in meadows throughout the Co. of Antrim, especially along the shores of L. Neagh, Herb. D.M. Glenariff, Shoolbred *I.N.* Knockagh, R.Ll.P.

***F. rubra* L.** To 1600 feet in the Mourne, S. & P.

***F. sylvatica* Vill.**

Down—Abundant and luxuriant by the Shimna and Spinkwee Rivers in Tollymore Park, S. & P.

***F. gigantea* Vill.**

Down—Moygannon Glen, Mourne Park, Tollymore Park, S. & P. Holywood Waterworks, R.Ll.P.

Antrim—Crumlin Waterfoot, S.A.S. Massereene Park, R.Ll.P.

Derry—Magilligan, Mrs. Leebody.

***F. arundinacea* Schreb.**

Down—Tollymore Park, S. & P. Dundrum, R.Ll.P.

Antrim—Templepatrick and Knockagh, S.A.S. Island at north end of Lough Beg, Mrs. Leebody. Bushfoot, R.Ll.P.

Derry—Upperlands, Kilrea, and Magilligan, R.Ll.P.

***Bromus sterilis* L.**

Down—Abundant from Killowen to Seafield, and sparingly at Warrenpoint, S. & P. Killowen church at Killyleagh, (R.Ll.P.), *B.N.F.C.* 1891-2.

Antrim—Roadside between Ballycastle and the sea, R.Ll.P.

For "railway bank" at Marino in *Flora* read "railway bridge."

***B. racemosus* L.**

Down—Holywood, R.Ll.P.

Antrim—Whitewell, R.Ll.P.

[*B. secalinus* Bab.

Antrim—Waste ground at Duncrue Street, Belfast, and hedge-bank at Magheragall near Lisburn, R.Ll.P.]

***Triticum caninum* L.**

Down—Shore a mile south of Newcastle, and near Kilkeel, S. & P. Sandy shore at Groomsport, S.A.S.

T. acutum DC.

Down—Gravelly shore of Ballyhornan Bay, S.A.S.

Antrim—Sandy shore, Red Bay, Shoolbred I.V.

T. junceum L.

Down—Kilkeel and Greencastle, S. & P.

Antrim—Ballycastle, R.L.P.

[Hordeum marinum L.

Antrim—Garron Point, 1861, H.W.L.]

Lepturus filiformis Trin.

Down—Between Warrenpoint and Narrow-water, H.W.L.

Antrim—Shores at Larne Lough plentifully, Herb. D.M.

[Lolium temulentum L.

Antrim—Near Larne, Herb. D.M.

Derry—Near Limavady, Mrs. Leebody.]

CRYPTOGAMIA.

EQUISETACEÆ.

Equisetum pratense Ehr.

Antrim—Glenocum; plentiful in a small glen branching off Glenbush, near the head of the latter, Herb. D.M. Carnlough, Herb. Canon Grainger. Glen on north side of Garron Point, R.L.P.

E. sylvaticum L. To 1000 feet in the Mourne, S. & P.

Down—Frequent in Mourne district, S. & P.

Antrim—Rasharkin, and from Ballymoney to Ballycastle, R.L.P.

Derry—Near Londonderry, Mrs. Leebody. Kilrea and Garvagh, R.L.P.

E. limosum L. To 1000 feet on the Mourne, S. & P.; to 1000 feet on Garron Point, R.L.P.**E. palustre** L., var. **β. polystachium**.

Antrim—Portrush sandhills, and sandy shore of Lough Neagh at Shanes' Castle, R.L.P.

var. *γ. nudum* DC.

Antrim—Sandy shore of Lough Neagh at Shane's Castle, R.L.P.

***E. hyemale* L.** To 1700 feet on the Mourne (C.H.W.), S. & P.

Down—By Kilbroney River, Yellow Water, Rocky River near Hilltown, Annalong River, and on Thomas Mountain (C.H.W.), S. & P. Near Edenderry, Templeton MSS.; refound here by R.L.P., on the edge of the Lagan; *B.N.F.C.* 1892-3. On the Lagan side half way between Shaw's Bridge and Drum Bridge [? Down or Antrim], Templeton MSS.

Antrim—Cullybackey, Herb. Canon Grainger. Glen above Hightown, north of Squire's Hill, C.H.W. By the Glenarm River above Park mill, and northern branch of Glenariff, R.L.P., *B.N.F.C.* 1892-3.

Derry—Glen near Magilligan, Mrs. Leebody.

***E. trachyodon* A. Braun.**

Antrim—Glenariff, Herb. D.M.

Derry—Refound in Ballyharrigan Glen, Mrs. Leebody.

FILICES.***Cryptogramme crispa* R.Br.** 1200-1700 feet on the Mourne, S. & P.

Down—Extremely rare, but seen in four of its half-dozen known Mourne stations by S. & P.

Polypodium vulgare* L.** To 2449 feet on the Mourne, S. & P.P. phegopteris* L.** To 2250 feet in the Mourne, Hart *R.I.A.* 800-2000 feet on the Mourne, S. & P.

Down—Frequent on the Mourne; some 20 stations are given by S. & P.

Antrim—Glencloy, R.L.P.

P. dryopteris L. Searched for on Knocklayd by S.A.S. in 1882, and by R.L.P. in 1892 and 1894, but without success. A more unlikely habitat for this fern than the bare slopes of Knocklayd could not be imagined, but Dr. Moore's record is supported by specimens in his herbarium. Could it have been planted there, as *P. Robertianum* was on Carlingford Mountain (*I.N.* 1893, p. 22)?

***astrea thelypteris* Presl.**

Antrim—Portmore Lough, Selchin, side of Lough Neagh, Herb. D.M.—additional notes which go to show the abundance of this fern before drainage operations destroyed it.

L. oreopteris[¶](Ehr.)[¶]Presl. 20-2000 feet on the Mourne, S. & P.

Down—A number of Mourne stations are given by S. & P., but the plant grows chiefly on the lower grounds of the northern slope, from Slieve Donard to Slievenaman.

Derry—By the Glenomna water, and on roadside above Upperlands, R.L.P.

L. filix-mas[¶](L.) Presl. To 1500 feet on the Mourne, S. & P.

var. β . **L. Borreri** Neum.

Common throughout the three counties, R.L.P.

var. δ . **L. abbreviata** DC.

Down—Abundant on cliffs of Eagle Mountain, 1300-1500 feet, S. & P.[¶]

L. spinulosa (Roth)[¶]Presl.

Derry—On bogs two miles south of Kilrea, R.L.P. Refound by the Roe above Limavady, Mrs. Leebody.

L. dilatata[¶](Willd.) Presl. To 2449 feet on the Mourne, S. & P.[¶]

L. æmula Brack. 100-1430 feet on the Mourne, S. & P.

Down—Local; in Mourne district, S. & P. Saintfield, C.H.W. NEED

Antrim—Glendun, S. A. Brenan. Roadside south of Bushmills, R.L.P.

Derry—By the Roe above Limavady, Mrs. Leebody.

Polystichum aculeatum (L.) Roth.

Down—Craigauntlet and Killinchy, R.L.P.

Antrim—Shane's Castle and Dunloy, R.L.P.

Cystopteris fragilis (L.) Bernh. 800—2000 feet on the Mourne, S. & P.

Down—Along the Slieve Muck ridge, S. & P.

Antrim—North base of Knocklayd, Herb. D.M. Glenshesk, J. H. Davies.

Derry—Cliffs of Benevenagh, Shoolbred *I.N.* Old wall at Kilrea, Mrs. Leebody.

Athyrium filix-fœmina (L.) Roth. To 2449 feet on the Mourne, S. & P.

Asplenium adiantum-nigrum L. To 1900 feet on the Mourne, S. & P.

Common throughout the district—a long list of further localities might be given.

var. β . *A. acutum* Bory. The Benevenagh plant of *Flora*, though a very acute form of *A. adiantum-nigrum*, cannot be correctly placed here. Sherard's Mourne[¶] Mountain plant (Herb. Oxon. and *Rai Synopsis*) is a barren plumose form of *Athyrium filix-fœmina*, the same as that known to fern growers as *kalothrix*, S. & P.

A. trichomanes L. To 1600 feet on the Mournes, S. & P.

Down—Frequent throughout the Mournes, S. & P. Crawfordsburn, R.L.P.

Antrim—White Park Bay and Giant's Causeway, R.L.P.

Derry—By the Roe above Limavady, Mrs. Leebody.

A. marinum L.

Derry—Benevenagh Cliffs, Shoolbred *I.N.*

A. ruta-muraria L. Growing on trap-rock on Benevenagh, R.L.P., *B.N.F.C.* 1892-3, and the same at Fair Head, R.L.P.

Ceterach officinarum (L.) Willd.

Down—Near Clough, *B.N.F.C.* 1889-90. Maryfield near Holywood, W. H. Patterson. Ringdufferin, J. Wilson. Larchfield near Legacurry, J. H. Davies. Ardilea House near Dundrum, R.L.P.

Antrim—Glenmore near Lisburn, J. H. Davies. Bridge in Glendun, S. A. Brenan.

Derry—Wall at Prehen near Londonderry, Mrs. Bernard.

The prevailing form in the district is var. *crenatum* Milde; the type is apparently rare.

Blechnum spicant Roth. To 2449 feet on the Mournes, S. & P.

Pteris aquilina L. To 1450 feet on the Mournes, Hart *R.I.A.*; 1400 feet on the Mournes, S. & P.

Adiantum capillus-veneris L. A sheet of small fronds in Mr. Hanbury's herbarium is labelled "Morne Mns., Co. Down, Ireland." There is no date or collector's name. The sheet has no history, and comes from some old herbarium.

Hymenophyllum tunbridgense (L.) Sm. Ferguson's and Dickie's Mourne plants must have been *H. unilaterale*, S. & P.

H. unilaterale Willd. To 1750 feet on the Mournes, Hart *R.I.A.*; 150—1500 feet on the Mournes, S. & P.

Down—Some additional Mourne Mountain localities are given by S. & P.

Osmunda regalis L.

Down—West side of Slieve Bingian, and by the Causeway water; still at Bloody Burn and sea-cliffs south of Newcastle; apparently extinct by the Glen River, S. & P.

Antrim—Island of Rathlin, sparingly, and on boggy ground along the side of Portmore Lough, Herb. D.M. Near Whitehall at Broughshane, S. A. Brennan. Still lingers by Lough Neagh at Shane's Castle, R.Ll.P.; S.A.S., *I.N.* 1894.

Derry—By Lough Bran above Maghera, R.Ll.P. Bog two miles east of Kilrea, R.Ll.P.

Botrychium lunaria (L.) Sw.

Down—Bloody Bridge, S. & P. Conlig Hill, R.Ll.P. Tonaghmore Hill near Saintfield, D. Redmond.

Antrim—Rathlin Island, R.Ll.P., *B.N.F.C.* 1889-90. Glenariff, S. A. Brennan. Summit of Binnagee near Carnlough, R.Ll.P.

Ophioglossum vulgatum L.

Down—Rostrevor, S. & P. Saintfield, C.H.W. Loughbrickland, H.W.L. Clandeboye demesne, R.Ll.P.

Antrim—Glenmore near Lisburn, J. H. Davies. Glenballyemon, S. A. Brennan. Langford Lodge and Binnagee, R.Ll.P.

Derry—Kilrea, Mrs. Leebody.

MARSILEACEÆ.

Pilularia globulifera L.

Antrim—Drain, side of Portmore Lough, Herb. D.M.

LYCOPODIACEÆ.

Isoetes lacustris L. 1100-1350 feet [not 1500] in the Mourne, S. & P. Descends to less than 50 feet in Antrim (Lough Neagh, D.M.).

Down—Blue Lough and Lough Shannagh, S. & P.

Antrim—Shore of Lough Neagh near Toome Bridge and Selchin, and at Lady Bay in parish of Glenavy, Herb. D.M. Craigfad Lough above Carnlough, R.Ll.P.

Lycopodium clavatum L.

Down—One plant on Slieve Donard at 2450 feet, S. & P. Slieve Commedagh, H.W.L.

Antrim—Skerry, Herb. D.M. Evish Mountain near Parkmore, and Glenleslie near Clogh, H.W.L. Summit of Knocklayd, R.Ll.P.

Derry—Crockmore above Draperstown, R.Ll.P., *Journ. Bot.* 1892.

L. alpinum L. 1900-2796 feet on the Mourne, S. & P.

Down—On most of the Mourne summits, S. & P.

Antrim—Near Retreat, S. A. Brennan. Cloughcor above Glenariff,
H.W.L. Summit of Trostan, and of Little Trosk above Carnlough,
R.Ll.P.

L. selago L. To 2796 feet on the Mourne, S. & P.

Selaginella spinosa Beauv. To 2020 feet on the Mourne, Hart *R.I.A.*
0-2000 feet on the Mourne, S. & P.

Down—Common on the Mourne, S. & P.

CHARACEÆ.

Chara fragilis Desv.

Down—Co. Down [Loughinisland], S.A.S. ; H. & J. Groves *Journ. Bot.*
1890. Warrenpoint town reservoir, S. & P. Ballyward Lake and
Castlewellan Lake, S.A.S. Bull's Eye near Downpatrick, Clande-
boye lakes. Conlig Hill, and Ballygowan quarries, R.Ll.P.

Antrim—Lough Neagh, D. Moore ; Groves *I.V.* Boghole above Carn-
lough, R.Ll.P.

var. **barbata** Gant.

Down—Holywood Hills, R.Ll.P. ; Groves *I.V.* South side of Tardree
Hill. Herb. Canon Grainger. Clandeboye lower lake, and near
Craiggauntlet, R.Ll.P.

Antrim—Lough Beg [Portmore Lough], W. Thompson ; Groves *I.V.*

var. **Hedwigii** Kuetz.

Down—Holywood Hills, R.Ll.P. ; Groves *I.V.*

var. **delicatula** Braun.

Antrim—Ram's Island, H.W.L.

C. aspera Willd.

Down—Money Lake, R.Ll.P.

Antrim—Rathlin, Hb. D. Moore ; Groves *I.V.* Lough Beg, R.Ll.P. ;
Groves *I.V.* (abundant at north end of the lake, R.Ll.P.). In
Lough Neagh near Shane's Castle, R.Ll.P.

Derry—Lough Beg, R.Ll.P. ; Groves *I.V.*

var. **lacustris** H. & J. G.

Antrim—Lough Neagh, Crumlin, S.A.S. ; Groves *I.V.*

var. **subinermis** Kuetz.

Antrim—Rathlin Island, D. Moore ; Groves *I.V.* Ram's Island,
H.W.L.

Derry—River Bann [below Coleraine], R.Ll.P. ; Groves *I.V.*

C. contraria Kuetz.

Down—Clandeboyne Lake, R.Ll.P., *B.N.F.C.* 1892-3.

Derry—Brackish pools at Limavady Junction, R.Ll.P. and W. D. Donnan; R.Ll.P., *B.N.F.C.* 1890-1.

C. hispida L.

Down—Downpatrick, R.Ll.P.; Groves *I.N.* It grows here in Money Lake and in the Bull's Eye, R.Ll.P.

Derry—R. Bann, Coleraine, D. Moore; Groves *I.N.* Magilligan, Mrs. Leebody.

var. **rudis** Braun.

Down—Money Lake, R.Ll.P.

C. vulgaris L.

Down—Downpatrick, and Clandeboyne Lakes, R.Ll.P.

Antrim—In Lough Neagh south of Shane's Castle, R.Ll.P.

Derry—Magilligan, Mrs. Leebody; Groves *I.N.*

var. **longibracteata** Kuetz.

Down—Co. Down [Victoria Park], S.A.S.; H. & J. Groves, *Journ. Bot.* 1890. Blackstaff Bridge near Kirkcubbin, R.Ll.P.

Antrim—Springfield, W. M. Hind; Groves *I.N.*

Nitella translucens Ag.

Down—Pool on Conlig Hill, W. D. Donnan. Very abundant in a small lake in Clandeboyne demesne, R.Ll.P.

Antrim—Lissanorn Castle, D. Moore; Groves *I.N.*

Derry—Kilrea, D. Moore; Groves *I.N.* (still there, R.Ll.P.). Enagh Lough, Mrs. Leebody. Killelagh Lough above Maghera, R.Ll.P.

N. opaca Ag.

Down—Tollymore Park, Burren River, Lough Island Reavy, and by Bann above Hilltown, S. & P. Money Lake and Ballygowan quarries, R.Ll.P.

Antrim—Ram's Island, H.W.L. Six-mile River at Templepatrick, S.A.S.

Derry—Kilrea, W. Thompson; Groves *I.N.* Racecourse bog near Londonderry, Mrs. Leebody. Killelagh Lough above Maghera, R.Ll.P.

MUSCI.

ANDREÆACEÆ.**Andreæa crassinervis** Bruch.

Down—Eagle Mountain, C.H.W.; Lett *R.I.A.*

A. rupestris (L.) Roth.

Down—Summit of Slieve Bignian, H.W.L.

var. **falcata** Schimper.

Down—Rocky Mountain near Hilltown, C.H.W.

var. **hamata** Lindb.

Down—Slieve Commedagh and Slieve Dermot, H.W.L.

POLYTRICHACEÆ.**Oligotrichum incurvum** (Huds.) Lindb.

Down—Devil's Brewing Pan at Mourne Mountains, Templeton MSS.

Antrim—Gravelly heath above Cave Hill Deerpark, C.H.W.

Polytrichum urnigerum Linn.

Derry—Garvagh, S. A. Brenan; H.W.L.

P. attenuatum Menz.

Down—Drumsallagh, Aghaderg, H.W.L. 1889. Saintfield demesne,
C.H.W. & H.W.L.

DICRANACEÆ.**Pleuridium axillare** (Dicks.) Lindb.

Down—Abundant in stubble fields, and by the lake shore at Loughbrickland, H.W.L.

P. subulatum (Huds.) Raben.

Down—Warrenpoint, C.H.W. Scarva, H.W.L.

Antrim—Glendun, S. A. Brenan; H.W.L.

Ditrichum homomallum (Hedw.) Hampe.

Antrim—Glenariff, H.W.L.

Anisothectum crispum (Schreb.) Lindb. var. **β. elatum**.

Antrim—Cushendall, H. N. Dixon, *Journ. Bot.* 1891.

Seems to be the only Irish locality for this variety.

A. rubrum (Huds.) Lindb.

Down—Deer's Meadow and Rocky Mountain, Lett *R.I.A.*

A. rufescens (Dicks.) Lindb.

Down—Abundant on shores of Loughbrickland, H.W.L.

A. squarrosum (Starke) Lindb.

Antrim—Slievenanee and Glenballyemon, H.W.L.

Campylopus flexuosus (L.) Brid.

Antrim—Cloughcor near Glenariff, H.W.L.

C. setifolius Wilson.

Down—Pigeon Rock Mountain, Lett *R.I.A.*

Dicranoweissia cirrata (L.) Lindb.

Antrim—On thorn bushes in Cave Hill Deerpark, C.H.W.

Dicranum majus Sm.

Derry—Lignapeiste Glen, Mrs. Leebody.

D. Bonjeani De Not.

Down—Slieve Dermot, Lett *R.I.A.*

Antrim—Parkmore, H.W.L.

D. fuscescens Turner.

Down—Shanlieve, C.H.W. ; Lett *R.I.A.*

D. Scottii Turner.

Down—Hen Mountain, Lett *R.I.A.*

Dichodontium pellucidum (L.) Schimp.

Antrim—Cushendall, H. N. Dixon, *Journ. Bot.* 1891.

D. flavescens (Dicks.) Lindb.

Antrim—Ballycastle, H. N. Dixon, *Journ. Bot.* 1891.

TORTULACEÆ.**Pottia Heimii** (Hedw.) Fuern.

Antrim—Giant's Causeway, H. N. Dixon, *Journ. Bot.* 1891.

Derry—Between Portstewart and Bann mouth, H.W.L.

P. Starkei (Hedw.) C. Muell.

Antrim—Ditch-bank at Ballysillan limestone quarries, S.A.S.

Tortula ericæfolia (Neck.) Lindb.

Down—Old quarry at Maralin, H.W.L.

Antrim—Ditch-bank at Ballysillan limestone quarry, S.A.S.

T. papillosa Wils.

Down—Drumsallagh, Aghaderg, H.W.L.

T. princeps De Not.

Antrim—Glenarm Deerpark, D.M.; *Brit. Moss Flora*.

Derry—Benevenagh, S.A.S.; *Brit. Moss Flora*.

Mollia microstoma Lindb.

Down—Near Warrenpoint, C.H.W.; *Iett R.I.A.*

Antrim—Ballycastle, H. N. Dixon, *Journ. Bot.* 1891.

M. æruginosa (Sm.) Lindb.

Antrim—Parkmore and Glenballyemon, H.W.L. Drumnasole, S. A. Brenan; H.W.L.

M. verticillata (L.) Lindb.

Down—Wall of bridge in Tollymore Park, C.H.W.; H.W.L.

Antrim—Glenarm, H. N. Dixon, *Journ. Bot.* 1891.

M. crispula (Bruch) Lindb.

Antrim—Ballycastle, in fruit, H. N. Dixon, *Journ. Bot.* 1891.

M. litoralis (Mitt.) Braith.

Antrim—Cushendall and Ballycastle, H. N. Dixon, *Journ. Bot.* 1891.

M. brachydontia Lindb.

Down—Kinehalla, H.W.L.

M. tenuirostris (Hook. & Tayl.).

Down—Several stations in Mourne Mountains, H.W.L.

M. inclinata (Hed.) Lindb.

Antrim—Portrush, H.W.L.

Derry—Portstewart, H.W.L.

M. tortuosa (L.) Schrank.

Antrim—Drumnasole, S. A. Brennan; H.W.L.

Barbula curvirostris (Ehr.) Lindb.Down—Cove Mountain, Lett *R.I.A.***B. spadicea** Mill.Down—Tollymore Park, Lett *R.I.A.***B. rigidula** (Hed.) Mitt.

Antrim—Fairhead, H.W.L.

B. cylindrica (Tayl.) Schimp.Antrim—Glenballyemon, H.W.L. Cushendall, H. N. Dixon, *Journ. Bot.* 1891.**B. unguiculata** (Huds.) var. **γ. apiculata** Hedw.

Down—Wall of Aghaderg Glebe, H.W.L.

Leersia contorta (Wulf.) Lindb.

Antrim—Rocks at upper end of Colin Glen, J. H. Davies. Glenballyemon, H.W.L. Glendun, S. A. Brennan; H.W.L.

WEBERACEÆ.**Webera sessilis** (Schmid.) Lindb.

Antrim—Slemish Mountain, H.W.L.

Stated in *Flora* to be barren. This was an error, as Mr. Lett finds it fruiting freely from early summer till late in autumn.

GRIMMIACEÆ.**Grimmia funalis** (Schwaeg.).Down—Slieve Dermot, Lett *R.I.A.***G. orbicularis** Bruch.Down—Top of stone fence on Spelga Mountain, H.W.L.; *Brit. Moss Flora*.

This is the only locality in the North of Ireland known to us.

G. trichophylla Grev.

Down—Fofanny, and Butter Mountain, Lett *R.I.A.* Bryansford,
C.H.W., *Brit. Moss Flora*.

Antrim—Basalt rocks at summit of Ballygally Head, S.A.S.

G. Hartmani Schimp.

Antrim—Fairhead, H. N. Dixon, *Journ. Bot.* 1891.

G. Donli Sm.

Down—Granite blocks between Slieve Martin and Kilbroney bog, Lett
R.I.A.

G. ovata was hastily inserted as an addendum when the *Flora* was at Press. This must be deleted, as it was subsequently ascertained to be an erroneous determination.

G. obtusa (Sm.) Lindb.

Down—Shanslieve, Slieve Donard and Slieve Bingian, Lett; *Brit. Moss Flora*.

G. affinis (Schleich.) Lindb. var. **β. gracilescens** Lindb.

Down—Shanslieve, Lett; *Brit. Moss Flora*.

G. patens (Dicks.) Br. et Schimp.

Antrim—The Craig rocks, Rasharkin, H.W.L.

By inadvertance 2700 was printed in *Flora* for 1200 feet, the highest elevation known to us.

ORTHOTRICACEÆ.

Orthotrichum Sturmii. The Lough Neagh locality of *Flora* must be transferred to *O. striatum*.

Orthotrichum diaphanum Schrad.

Down—Donard demesne and Loughbrickland, H.W.L.

O. cupulatum Hoffm.

Antrim—Glenarm, H. N. Dixon, *Journ. Bot.* 1891.

O. stramineum Hornsch.

Antrim—Fairhead, D.M.; herb. Carrington, *vide* G. A. Holt.

O. rivulare Sm.

Antrim—Ram's Island, J. H. Davies.

O. pulchellum Sm.

Down—On apple trees at Ravernet, J. H. Davies.

Antrim—Parkmore, H.W.L.

Weissia Bruchii (Hornsch.) Lindb.

Antrim—Glenariff, S.A.S. Glendun, S. A. Brennan; H.W.L.

W. vittata (Mitt.) Braith.

Antrim—Glenshesk, 1880, and Glenariff, 1889, S.A.S.; *Brit. Moss Flora*.

SPLACHNACEÆ.**Tetraplodon bryoides** (Mitt.) Braith.

Antrim—Glenariff, S. A. Brennan.

FUNARIACEÆ.**Funaria obtusa** (Dicks.) Lindb.

Antrim—Sallagh Braes, C.H.W.

F. attenuata (Dicks.) Lindb.

Down—Wet rocks near Donaghadee, J. H. Davies.

Antrim—Islandmagee, J. H. Davies.

Derry—Benbradagh Mountain, Mrs. Leebody.

It is to be regretted that the name of Templeton, our pioneer botanist, which was associated with this plant by Smith in 1813, has to be replaced by a prior term.

F. calcarea Wahlenb.

Antrim—Near Carrick-a-rede, H. N. Dixon, *Journ. Bot.* 1891.

BRYACEÆ.**Leptobryum pyriforme** (L.) Wils.

Down—Abundant on flower-pots at Aghaderg, H.W.L.

Pohlia acuminata Hornsch.

Down—Wet rocks at Blackstairs, Slieve Donard, and on Spaltha Mountain, Lett *R.I.A.*

P. nutans (Schreb.) Lindb. var. **longiseta** Brid.

Down—County Down [Cotton Moss], S.A.S.; *Brit. Moss Flora*.

P. annotina (L.) Lindb.

Down—Shanlieve, S.A.S. Slieve Bingian, Lett *R.I.A.*

P. albicans (Wahl.) Lindb.

Down—Wayside well near Fofanny, Lett *R.I.A.*

Plaglobryum Zierli (Dicks.) Lindb.

Antrim—Sallagh Braes, C.H.W.

Bryum inclinatum (Swartz) Bland.

The station in Victoria Park assigned to this species was an error, the plant having subsequently been decided to be *B. intermedium*.

Bryum Mildei Juratz.

Antrim—Slemish Mountain, Moore; *Brit. Moss Flora*.

B. alpinum Huds.

Down—White River Glen, Lett *R.I.A.* Fruiting very sparingly in Mourne Mountains, S.A.S., July, 1888.

Antrim—Rasharkin bog, H.W.L. & C.H.W.

B. pallens Swartz.

Down—Slieve Donard, Lett *R.I.A.*

Antrim—Parkmore, H.W.L.

B. ventricosum Dicks.

Down—Leitrim near Hilltown, and frequent in the Mourne Mountains, Lett *R.I.A.*

Antrim—Near Parkmore, H.W.L. By the stream in Glenshesk, in fine fruit, J. H. Davies.

Derry—Lignapeiste Glen, Mrs Leebody.

B. proliferum (L.) Sibth. (*B. roseum* Dill.).

Down—Newcastle, C.H.W.

[BARTRAMIACEÆ.**Bartramia pomiformis** (L.) Hedw.

Antrim—Drumnasole, S. A. Brennan; H.W.L.

B. norvegica (Gunn.) Lindb.

Antrim—Fruiting in Glenariff, H.W.L.

B. fontana (L.) Swartz var. **β. falcata** Brid.

Antrim—Rasharkin, H.W.L. & C.H.W.

MNIACEÆ.**Gymnocybe palustris** (L.) Fries.

Antrim—Glendun, S. A. Brenan; H.W.L.

Aulacomnium and *Sphærocephalus* must give way to the prior name of Fries.

Mnium riparium Mitt.

Antrim—A few barren stems intermixed with other mosses in wet bog at Glenariff, H.W.L.

The only Irish locality known at present.

M. cuspidatum (L.) Neck.

Antrim—Wet ditch at Hightown, Carnmoney, C.H.W.

M. pseudopunctatum Bruch & Schimp.

Antrim—Parkmore, H.W.L.

HYPNACEÆ.**Leskea polycarpa** Ehr.

Down—Loughbrickland, H.W.L.

Anomodon viticulosus (L.) Hook. & Tayl.

Antrim—Fruiting at Drumnasole, S. A. Brenan; H.W.L.

Hypnum filicinum Linn.

Antrim—Glendun, S. A. Brenan; H.W.L.

H. confervoides Bridel.

Derry—Sandy warren at Portstewart, S.A.S., 1884.

The only Irish station.

H. irriguum Wils.

Down—Rocky stream in Drumbo Glen, S.A.S.

Doubtfully mentioned in excluded list of *Flora*.

H. riparium Linn.

Down—Shore of Loughbrickland, H.W.L.

Antrim—By the Lagan near Glenmore. J. H. Davies. Pond by railway line north of Kilroot, S.A.S. Parkmore, H.W.L.

H. stellatum Schreber.

Down—Stormount Glen, and marsh on Conlig Hill, S.A.S.

Antrim—Glendun, S. A. Brennan ; H.W.L. Abundant in Rasharkin bog,
H.W.L.

H. fluitans Linn.

Antrim—Parkmore and Lurgethan, H.W.L. Glendun, S. A. Brennan ;
H.W.L.

H. Kneiffii Br. & Schimp.

Down—Near shore of Lough Neagh at Kilmore, C.H.W. Loughbrick-
land, H.W.L.

H. revolvens Swartz.

Down—Slieve Dermot, Lett *R.I.A.*

Antrim—Glenballyemon, H.W.L.

Derry—Marshes in Portstewart sandhills, S.A.S.

H. scorpioides Linn.

Down—Margin of Ballyward Lake and of Pollramer Lake, and in fruit
in a marsh on Conlig Hill, S.A.S.

Antrim—Glenariff and Glendun, H.W.L.

H. ochraceum Turner.

Antrim—Glenariff, H.W.L.

H. sarmentosum Wahl.

Down—Shanslieve, Lett *R.I.A.*

H. Swartzii Turner.

Antrim—Glendun, S. A. Brennan ; H.W.L.

H. speciosum Brid.

Antrim—Knockagh, C.H.W.

H. crassinervum Tayl.

Antrim—Knockagh, and on wall at Carnmoney, and on limestone blocks
in Cave Hill Deerpark, C.H.W. Glenariff, H.W.L.

H. piliferum Schreb.

Down—Tollymore Park, C.H.W.

Antrim—Glendun, S. A. Brennan ; H.W.L.

H. tenellum Dicks.

Down—Greenhouse at Aghaderg Glebe, H.W.L. Wall of bridge in
Tollymore Park, Lett *R.I.A.*

Antrim—Walls about Coole Glebe, Carnmoney, C.H.W. Parkmore,
H.W.L. Drumnasole, S. A. Brennan; H.W.L.

H. flagellare Dicks.

Down—Rocks by the river at Tollymore Park, Templeton (spec. in herb. Belf. Mus.). Slieve Donard, Slieve Commedagh, and frequent in the Mourne range, but always barren, S.A.S., *Suppl. to Mosses of N.E. Ireland*. Tollymore, Yellow Water, &c., frequent, C.H.W. Common throughout the Mourne range, Lett *R.I.A.*

Antrim—Glenariff, H.W.L.

Localities for this species were published in *Supplement to Mosses of North-East Ireland*, but accidentally omitted from *Flora*.

H. heteropterum (Bruch).

Down—Slieve Bingian and Slieve Meel Beg, Lett *R.I.A.* Rostrevor Mountain, C.H.W.

Antrim—Slemish Mountain, H.W.L. & C.H.W.

In following Moore and giving *H. atrovirens* Turner as a synonym for "*H. heteropterum*," the authors of the *Flora* were in error, as Mr. Lett has pointed out to us. Moore's second synonym, *H. catenulatum*, is likewise erroneous.

H. cupressiforme Linn. var. *lacunosum* Wils.

Down—Slievenabrock, Lett *R.I.A.*

H. resupinatum Wils.

Down—Slieve Donard, H.W.L.

H. Patientiæ Lindb.

Down—Saintfield, C.H.W.

Antrim—Glendun, S. A. Brennan; H.W.L. Carnmoney and Hyde Park, widely distributed, C.H.W.

H. Borreri Spruce.

Down—Saintfield, C.H.W. Sandy bank at Knocknagoney, S.A.S.

Antrim—Slemish and Sallagh Braes, C.H.W.

H. pulchellum Dicks.

Down—Tollymore Park, C.H.W.

Antrim—Glenariff, C.H.W. & H.W.L.

H. undulatum Linn.

Antrim—Parkmore, H.W.L.

Derry—Benbradagh Mountain, Mrs. Leebody.

H. sylvaticum Linn.

Down—Slieve Donard, Lett *R.I.A.*

H. denticulatum Linn.

Down—Chimney Rock Mountain, Lett *R.I.A.* In a small glen close to Dundonald station, S.A.S.

SPHAGNACEÆ.**Sphagnum Austini** Sulliv.

Antrim—Evis Mountain near Parkmore, H.W.L., 1889.

Mr. Lett, who was the first to find this plant in Ireland, has subsequently (1892) met with it in King's County.

S. papillosum Lindb.

Down—Common in Mourne Mountains, Lett *R.I.A.*

Antrim—Parkmore, H.W.L. Glendun, S. A. Brennan; H.W.L.

S. tenellum Ehr.

Antrim—Glendun, S. A. Brennan; H.W.L.

S. subsecundum Nees & Von Es.

Antrim—Crockalough near Parkmore, H.W.L.

var. **obesum** Wilson.

Derry—Racecourse bog at Ballyarnot, Mrs. Leebody.

S. rigidum Nees & Von Es. var. **β. compactum** DC.

Antrim—Parkmore, Crockalough, and Rasharkin bog, H.W.L. Glendun, S. A. Brennan; H.W.L.

S. teres Angst.

Down—Hen Mountain, Lett *R.I.A.*

The only Irish station known at present.

S. acutifolium Ehr.

Antrim—Glendun, S. A. Brennan; H.W.L.

A number of varieties of this polymorphic species occur.

S. intermedium Hoffm.

Antrim—Parkmore, H.W.L.

S. cuspidatum Ehr.Down—Rostrevor Mountain, C.H.W. ; Lett *R.I.A.*

Antrim—Parkmore and Glenballyemon, H.W.L.

var. **plumosum** Nees & Hsch.

Antrim—Glendun, S. A. Brennan ; H.W.L.

HEPATICÆ.

JUNGERMANNIACEÆ.

Frullania fragillifolia Tayl.Antrim—"The Craigs," Rasharkin, H.W.L. & C.H.W. Glenariff,
H.W.L.**Lejeunea hamatifolia** Hook.

Antrim—Glenariff, C.H.W.

L. calcarea Libert.

Antrim—Glenariff, H.W.L. and C.H.W.

L. ovata (Dicks.) Tayl.

Antrim—Glenariff, C.H.W.

L. microscopica Tayl.

Antrim—Glenariff, C.H.W.

L. patens Lindb.Antrim—On *Neckera crispa* at Sallagh Braes, H.W.L.**L. Mackali** (Hook.) Spreng.Down—On an old yew tree in Tollymore Park, C.H.W. ; Lett *R.I.A.*Antrim—Limestone rocks in Redhall Glen, 1809, Templeton. Gobbin
cliffs, C.H.W. Glenariff, H.W.L.**Porella rivularis** Nees.

Down—Saintfield, C.H.W.

Pleurozia purpurea (Lightf.) Dum.

Antrim—Rasharkin bog, H.W.L. & C.H.W. Evish Mountain, H.W.L.

Trichocolea tomentella (Ehr.).

Down—By a rivulet in Belvoir Park, Templeton.

Antrim—Glendun, S. A. Brennan; H.W.L.

Lepidozia setacea (Web.) Dum.

Down—Hen Mountain, Lett *R.I.A.* Tollymore Park, H.W.L.

Antrim—Glendun, S. A. Brennan; H.W.L. Rasharkin bog, H.W.L.

Bazzania trilobata (L.) Gray.

Down—Tollymore Park, Templeton.

Odontoschisma sphagni (Dicks.).

Down—Tollymore Park and Cock Mountain, C.H.W.; Lett *R.I.A.*

Antrim—Cloughcor near Parkmore, H.W.L.

Cephalozia divaricata (Sm.).

Down—Hen Mountain and bog between Hilltown and Rathfriland, Lett *R.I.A.* Tollymore Park, C.H.W.

Antrim—Parkmore, H.W.L.

This was probably the plant noted by Templeton as *C. byssacea*, occurring at Lambeg, Cranmore, etc.

C. connivens (Dicks.) Spruce.

Down—Slievenamady, Lett *R.I.A.*

Kantia trichomanis (Linn.).

Down—Bog near Ballynahinch, H.W.L.

Antrim—Glendun, S. A. Brennan; H.W.L. Parkmore and Lurgethan, H.W.L.

Scapania nemorosa (L.) Dum.

Down—Saintfield, frequent, C.H.W.

Antrim—Glendun, S. A. Brennan; H.W.L. Lurgethan, H.W.L.

S. resupinata (L.) Dum.

Antrim—Fairhead and Glendun, in company with Taylor, Hooker, and Stokes, Templeton.

S. umbrosa (Schrad.) Dum.

Down—Hen Mountain, H.W.L.

S. curta (Mart.) Dum.

Down—Ballyvarley bog, Aghaderg, H.W.L.

Chiloscyphus polyanthos (L.) Corda.

Down—Aghaderg Glebe and Ballyvarley bog, H.W.L.

Antrim—Slemish, Templeton. Glendun, S. A. Brennan ; H.W.L.

Leptoscyphus interruptus Nees var. **β. pyrenaicum** Spruce.

Down—Roadside wall south of Rostrevor quay, H.W.L.

Plagiochila spinulosa (Dicks.) Dum.

Antrim—Gobbin cliffs, C.H.W. Drumnasole and Rasharkin bog, H.W.L.

P. tridenticulata (Tayl.).

Antrim—Drumnasole, S. A. Brennan ; H.W.L.

Jungermannia riparia Tayl.

Down—Cove Mountain, Lett *R.I.A.*

Antrim—Colin Glen, C.H.W. Drumnasole and Glendun, S. A. Brennan ;
H.W.L. Glenariff and Rasharkin bog, H.W.L.

J. crenulata Sm. var. **gracillima** Sm.

Down—Tollymore Park and Slieve Commedagh, Lett *R.I.A.* Aghaderg,
H.W.L.

J. pumila With.

Antrim—Glendun, S. A. Brennan ; H.W.L. Slievenanee, H.W.L.

J. sphærocarpa Hook.

Antrim—Colin Glen, 1818, Templeton. Parkmore, H.W.L.

J. barbata Schreb. (Coll.).

Antrim—Rasharkin bog and Slemish Mountain, H.W.L.

Given by Mr. Lett as *J. barbata* var. *quinquedentata*, but Schreber's species seems inseparable from *quinquedentata* Hudson.

Nardia sphacelata Giesecke.

Down—Slieve Donard, J. J. Andrew ; H.W.L.

N. hyalina (Lyll) Carring.

Down—Cove Mountain and Hen Mountain, H.W.L.

Antrim—Parkmore, H.W.L.

Cesia crenulata (Gottsche) Carring.

Antrim—Shady rocks on north-east side of Slemish, H.W.L. & C.H.W.

***Pellia calycina* (Tayl.).**

Down—Aghaderg, H.W.L.

Antrim—Drumnasole, S. A. Brennan ; H.W.L. Parkmore, H.W.L.

***Aneura pinguis* (L.) Dum.**

Derry—Portstewart, S.A.S.

***A. multifida* (Dill.) Gray.**

Down—Loughbrickland, H.W.L.

Antrim—Seymour Hill, Templeton.

MARCHANTIACEÆ.***Preissia commutata* Nees.**

Down—Scarva demesne, H.W.L.

Antrim—Parkmore, H.W.L. Glendun, S. A. Brennan ; H.W.L.

***Lunularia cruciata* (Linn.) Dum.**

Down—Drumcro, C.H.W. Aghaderg, H.W.L.

Antrim—Moss hole at Seymour Hill, Templeton, 1806. East end of Belfast Botanic Gardens, H.W.L.

RICCIACEÆ.***Riccia fluitans* Linn.**

Down—Abundant in a drain at Meenan bog, Loughbrickland, H.W.L.

ANTHOCEROTACEÆ.***Anthoceros punctatus* Linn.**

Down—Clover and stubble fields in Parish of Aghaderg, H.W.L.

Antrim—Belfast Botanic Gardens and river bank in Glendun, H.W.L.

ERRONEOUS OR DOUBTFUL HEPATICS.

The following hepatics, quoted from the Templeton MSS., have been deemed too doubtful for insertion in the foregoing list. While the greater part are certainly errors, it is probable that some may yet be verified, and with this view they are now made public :—

Porella thuja. On the rock at the waterfall in Woodburn Glen, 31st March, 1807.

Cephalozia curvifolia. Rock crevices on Bingian Mountain.

C. byssacea. Lambeg, Cranmore, and Birky moss.

Harpanthus scutatus. Glen below Rockport.

Plagiochila tridenticulata. Common on the rocks of the Cave Hill.

Mylia anomala. Annahilt bog and summit of Divis. [Perhaps the same plant as his *M. Taylora*.]

Jungermannia cuneifolia. Near top of Divis.

J. pumila. Common on bare ground about Belfast.

J. barbata. Common in the recumbent state on the rocks about the Cave Hill ; also on Divis Mountain, and in Ness Glen.

J. exsecta. With the next species on Holywood Warren.

J. excisa. Divis and Black Mountain, and on Holywood Warren.

J. incisa. Lambeg. Moor halfway between Holywood and Bangor, and rocky bank above the Manyburn at Purdysburn racecourse.

Nardia compressa. Near Belfast.

In the foregoing list Templeton's nomenclature, which was that current in his time, has been replaced by names now adopted.

ADDENDA ET CORRIGENDA.

p. 135. Add *Grimmia ovata* to the list of plants to be withdrawn from *Flora*.

p. 139. *Sparganium neglectum* was recorded prematurely; on referring the specimen to the describer of that form, it was named by him *S. ramosum* var. *microcarpum*, and is recorded under that name in the body of the Supplement, p. 201.

pp. 142-3. A number of specimens of cryptogams have been examined and verified since the first portion of the manuscript went to press, and the following have to be placed to lists of additions in the Introduction.

DISTRICT 12.

Hypnum confervoides.
H. flagellare.

Bryum Mildei.

COUNTY DOWN.

Hypnum flagellare.

COUNTY ANTRIM.

Tortula princeps.
Hypnum flagellare.

Bartramia norvegica.

COUNTY DERRY.

Hypnum confervoides.
H. revolvens.

Funaria attenuata.
Aneura pinguis.

A
BIBLIOGRAPHY
OF
IRISH GLACIAL
AND
POST-GLACIAL GEOLOGY.

BY
R. LLOYD PRAEGER, B.E.

BEING AN APPENDIX (No. 6 OF VOL. 2) TO THE PROCEEDINGS
OF THE

BELFAST NATURALISTS' FIELD CLUB

FOR 1895-96.

A BIBLIOGRAPHY

OF

IRISH GLACIAL AND POST-GLACIAL GEOLOGY.

THE following list of books, papers, and notes bearing on the glacial and post-glacial geology of Ireland had but a small beginning. It originated in a few dozen references to records of post-glacial fossils in the North-east of Ireland, thrown together for my own convenience. This list was added to by degrees, accumulating according to the manner of a snowball, each paper giving references to a number of others. Eventually, it appeared to me that if the list could be extended, completed, and published, it might prove a saving of time and labour to other workers; and in this thought I had especially in my mind the energetic members of the Geological Section of the Belfast Naturalists' Field Club, who have not convenient access to many of the journals, &c., quoted below, and on whom Prof. Cole recently urged¹ the importance of getting together their local geological literature.

In order to complete the list, systematic work was necessary, and sets of Periodicals and Proceedings of Societies which might contain references to Irish geology had to be carefully gone through. This portion of the work proved more extensive and tedious than was expected, and indeed had I known how much time it would involve, it is doubtful if the present effort would have seen the light. But in spite of time and care, I am well aware that my list must contain many omissions, though it is hoped that none of them are serious ones. Geologists working at any branch of the subjects included in the present compilation, or at the geology of any particular district, are nearly sure, among the scattered records of Irish geology, to unearth some references which, in my necessarily hurried work, have escaped notice. To them I would appeal to favour me with a note of such references, in order that, by the publication of a supplement, the present attempt may justify its title, and become a complete guide to the literature of Irish glacial and post-glacial geology.

As to the scope of the present list. Although believed to be of Pliocene, not Pleistocene age, the so-called "manure gravels" of Wexford have been included. They are the only marine Tertiary beds in Ireland, and are moreover of late Pliocene age, possessing a fauna distinctly related to that of the incoming glacial period; when to these is added the fact that the literature relating to the Wexford beds is much mixed up with that of the succeeding series, the advantage and convenience of this inclusion will be apparent. In view of recent papers in the *Irish Naturalist* on caves, and Dr. Scharff's bibliography of that subject, references to caves have been included, even if these references had no distinctly geological bearing; for much cave-exploration remains to be carried out in Ireland, as to both their past and present fauna; and a list of localities is therefore a desideratum.

In dealing with the human period, a difficulty constantly presented itself as to

¹*Irish Naturalist*, IV., 49. 1895.

how far papers on the remains of pre-historic man were admissible in a geological bibliography. Thus, while a flint implement found in the stratified marine gravels of Antrim, or a bronze celt in a stalagmitic deposit, are objects of distinct geological interest, the same cannot be said of a cinerary urn found in a kist, or a flint arrow-head which the urn may have contained. But it is difficult to draw the line, for geology and archæology not only meet, but overlap. The rule which I have endeavoured to follow is to admit papers which describe the *mode of occurrence* or *stratigraphical position* of human relics, and to omit papers dealing with objects artificially buried, or merely with the affinities or ornament of objects found. Thus sand-hill sites, crannogs, cave-deposits, and flint implement gravels are included; but papers on such subjects shade imperceptably into others which are purely ethnographical in their bearing.

In the way of existing bibliographies there was very little to assist me. The only papers giving even a tolerably complete bibliography of any part of the subjects included in the present paper, or of any district, were Dr. V. Ball's list of papers on Irish fossil mammals (39)* and Mr. Hardman's list of papers on North of Ireland geology (251). The shorter lists of papers given by Adams (5, 6), Close (129), Cole (136), Gray (232), Hull (297), M'Henry (492), and Scharff (607), were of course consulted. I made a point of verifying every reference by consultation of the original publication, where possible; the few papers (4 out of the 767 which have a place in the list) which I was not able to consult are distinguished by an asterisk.

Subjoined are particulars relating to Proceedings of Societies and to Journals systematically examined for references to the subject included in the list, the contracted titles used in the list being added in parenthesis:—

ACADEMIES' PROCEEDINGS, &c.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE:

Reports, years 1—64, 1831-1894. (*Brit. Assoc. Reports.*)

GEOLOGICAL SOCIETY OF LONDON:

Quarterly Journal, I.—LI., 1845-1895. (*Q.J.G.S.*)

GEOLOGISTS' ASSOCIATION, LONDON:

Proceedings, I.—XIV. pt. 5, 1859-1895. (*Proc. Geol. Assoc.*)

ANTHROPOLOGICAL INSTITUTE:

Journal, I.—XXV. pt. 2, 1871-1895. (*Journ. Anthropol. Inst.*)

GEOLOGICAL SURVEY OF IRELAND:

Memoirs, 120 parts, 1858-1891. 8vo.

ROYAL IRISH ACADEMY:

Proceedings, I.—X., 1836-1870; 2nd s. (*Science*), I.—IV., 1869-1888;

2nd s. (*Polite Literature and Antiquities*), I.—II., 1870-1888;

3rd s., I.—III. pt. 4, 1887-1895. 8vo. (*Proc. R.I.A.*)

Transactions, I.—XXX. pt. 17, 1785-1895. 4to. (*Trans. R.I.A.*)

ROYAL DUBLIN SOCIETY:

Journal, I.—VII., 1856-1878. 8vo. (*Journ. R.D.S.*)

Scientific Proceedings, n.s., I.—VIII. pt. 4, 1878-1895. 8vo. (*Sci. Proc. R.D.S.*)

* The numbers refer to the index numbers in the general list.

Scientific Transactions, 2nd s., I.—V. pt. 11, 1877-1895. 4to. (*Sci. Trans. R.D.S.*)

GEOLOGICAL SOCIETY OF DUBLIN :

Journal, I.—X., 1833-1864. (*Journ. G.S.D.*)

ROYAL GEOLOGICAL SOCIETY OF IRELAND (previously Geological Society of Dublin) :

Journal, I.—VIII. (XI.—XVIII. of whole series), 1864-1889. (*Journ. R.G.S.I.*)

DUBLIN NATURAL HISTORY SOCIETY :

Proceedings, I.—VI., 1849-1870. (*Proc. Dublin Nat. Hist. Soc.*)

BELFAST NATURALISTS' FIELD CLUB :

Reports, 1—10. 1863-4—1872-3. (*Ann. Reports B.N.F.C.*)

Annual Reports and Proceedings, 2nd s., I.—IV. pt. 2, 1873-4—1894-5. (*Proc. B.N.F.C.*)

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY :

Proceedings, 11 vols., 1871-2—1881-2.

Reports and Proceedings, 13 vols., 1882-3—1894-5. (*Proc. B.N.H. & P.S.*)

CORK HISTORICAL AND ARCHÆOLOGICAL SOCIETY :

Journal, I.—III., 1892-1894 ; and n.s.I., 1895. (*Journ. Cork Hist. & Arch. Soc.*)

KILKENNY ARCHÆOLOGICAL SOCIETY :

Transactions, I.—II., 1849-1853. (*Trans. Kilk. Arch. Soc.*)

Proceedings and Transactions, III., 1854-1855. (*Proc. and Trans. Kilk. Arch. Soc.*)

KILKENNY AND SOUTH-EAST OF IRELAND ARCHÆOLOGICAL SOCIETY :
(Previously Kilkenny Archæological Society.)

Journal, n.s., I.—VI., 1856-1867. *Journ. Kilk. & S.E. Ireland Arch. Soc.*)

HISTORICAL AND ARCHÆOLOGICAL ASSOCIATION OF IRELAND :

(Previously Kilkenny & S.E. Ireland Arch. Soc.)

Journal, 3rd s., I., 1868-1869. (*Journ. H. & A.A.I.*)

ROYAL HISTORICAL AND ARCHÆOLOGICAL ASSOCIATION OF IRELAND :

(Previously Hist. & Arch. Assoc. of Ireland.)

Journal, 4th s., I.—IX., 1870-1889. (*Journ. R.H. & A.A.I.*)

ROYAL SOCIETY OF ANTIQUARIES OF IRELAND :

(Previously R. Hist. & Arch. Assoc. of Ireland.)

Proceedings and Papers, 5th s., I., 1890-1891. (*Proc. and Papers R.S.A.I.*)

Journal, 5th s., II.—V., 1892-1895. (*Journ. R.S.A.I.*)

JOURNALS, &c.

Geological Magazine :

Decade 1, vol. I. to decade 4, vol. II., 1864-1895. (*Geol. Mag.*)

Geologist, The :

From 1858 to 1864.

Glacialists' Magazine :

I.—III. pt. 3, 1893-1895.

Geological Record :

From 1874 to 1884.

Annals of British Geology :

From 1890 to 1894.

Natural History Review :

I.—VII., 1854-1860; and n.s., I.—V., 1861-1865. (*Nat. Hist. Review.*)

Dublin Quarterly Journal of Science :

I.—VI., 1861-1866. (*Dublin Q.J.S.*)

Dublin Philosophical Journal and Scientific Review :

I.—II., 1825-1826. (*Dublin Phil. Journ. & Scient. Review.*)

Irish Naturalist :

I.—IV., 1892-1895. (*I.N.*)

Ulster Journal of Archæology :

I.—IX., 1853-1862.

New Issue, I., 1894-95. (*Ulst. Journ. Arch.*)

About a hundred books on geology, archæology, topography, &c., which contained, or might have contained, references to the subjects in hand, were likewise looked through.

Occasional references were also made to the following :—

ACADEMIES' PROCEEDINGS, &c :—

ROYAL SOCIETY OF LONDON :

Philosophical Transactions. (*Phil. Trans.*)

GEOLOGICAL SURVEY OF GREAT BRITAIN :

Memoirs.

PALÆONTOGRAPHICAL SOCIETY :

(*Publications.*)

GEOLOGICAL SOCIETY OF LONDON :

Proceedings. (*Proc. Geol. Soc. London.*)

ZOOLOGICAL SOCIETY OF LONDON :

Proceedings. (*Proc. Zool. Soc. London.*)

SOCIETY OF ANTIQUARIES OF LONDON :

Proceedings. (*Proc. Soc. Ant. London.*)

MANCHESTER GEOLOGICAL SOCIETY :

Proceedings. (*Proc. Manchester Geol. Soc.*)

LITERARY AND PHILOSOPHICAL SOCIETY OF MANCHESTER :

Proceedings. (*Proc. Lit. & Phil. Soc. Manchester.*)

LIVERPOOL GEOLOGICAL SOCIETY :

Proceedings. (*Proc. L'pool Geol. Soc.*)

GEOLOGICAL AND POLYTECHNIC SOCIETY OF THE WEST RIDING OF YORKSHIRE :

Proceedings. (*Proc. Geol. & Polytechnic Soc. of W. Riding of Yorks.*)

SOCIETY OF ANTIQUARIES OF SCOTLAND :

Proceedings. (*Proc. Soc. Ant. Scotland.*)

EDINBURGH GEOLOGICAL SOCIETY :

Transactions. (*Trans. Edinb. Geol. Soc.*)

ROYAL PHYSICAL SOCIETY OF EDINBURGH :

Proceedings. (*Proc. R. Phys. Soc. Edinb.*)

GEOLOGICAL SOCIETY OF GLASGOW :

Proceedings. (*Proc. Geol. Soc. Glasgow.*)

NATURAL HISTORY SOCIETY OF GLASGOW :

Proceedings. (*Proc. Nat. Hist. Soc. Glasgow.*)

ROYAL DUBLIN SOCIETY :

*Proceedings.** (*Proc. R.D.S.*)

WATERFORD AND SOUTH-EAST OF IRELAND ARCHÆOLOGICAL SOCIETY :

Journal. (*Journ. Waterford & S.E. Ireland Arch. Soc.*)

MUSÉUM D'HISTOIRE NATURELLE (Paris) :

Annales.

SOCIÉTÉ DE SPÉLÉOLOGIE (Paris) :

Spelunga: Bulletin.

JOURNALS, &c.—

*Academy.**Annales des Sciences Naturelles.**Annals and Magazine of Natural History.* (*Ann. & Mag. Nat. Hist.*)*Annals of Philosophy.**Archæologia.**Archæological Journal.**Dublin Evening Telegraph.**Dublin Penny Journal.**Edinburgh Journal of Science.**Edinburgh New Philosophical Magazine.* (*Edinb. New Phil. Mag.*)*Farmers' Gazette.**Irish Penny Magazine.**Magazine of Natural History* (*Mag. of Nat. Hist.*)* Not to be confounded with the *Scientific Proceedings* issued by this Society.

Natural Science.

Nature.

Philosophical Magazine. (*Phil. Mag.*)

Popular Science Review.

Science Gossip.

Zoologist. (*Zool.*)

It only remains to add a few particulars concerning the list which follows.

Brackets are used to show all editorial additions—the subject of papers which have no printed title, the names of authors of papers published anonymously, and all editorial comments, &c.

When the title of a paper does not sufficiently express its scope, a brief note of its contents is added.

A book or paper is not included in the list if it merely quotes from another without any original expression of opinion—such, for instance, are the references to Irish glacial geology in certain general text-books of geology.

Announcements of exhibits or donations, accounts of excursions, or other officially supplied items in the Proceedings of Societies, are entered under the name of the Society publishing them.

When the date of the reading of a paper before a Society differs from its date of publication, the former is usually given in brackets in addition to the latter. The Volumes of Proceedings of Societies are usually published in parts, and the publication of a volume frequently extends over several years. In bound volumes there is frequently no means of discovering the date of publication of any particular paper, owing to the destruction of the covers or temporary title-pages of the parts. In such cases the date given without brackets is the date on the title page of the volume; the *collective* date of the volume being usually added in brackets immediately after the number of the volume.

In addition to the contracted titles already given, the following contractions are used:—*descr.*=description; *ref.*=reference; *locs.*=localities; *glac.*=glacial; *post-glac.*=post-glacial; *geol.*=geology.

The list includes papers published up till the end of the year 1895.

LIST OF PAPERS, &c.

1 A. (M.).

Islands of Oyster Shells. *Journ. Cork Hist. & Arch. Soc.*, II., 39. 1893. [Near Fota, Co. Cork.]

2 Adams (A. Leith).

Report on the Exploration of the Shandon Cave. *Trans. R.I.A.*, XXVI., 187—230, plate 3. 1876. [Full descr. of deposits and animal remains.]

3 —

Observations on the Remains of Mammals found in a Fossil State in Ireland. *Journ. R.G.S.I.*, IV., 246—248. 1877.

4 —

Monograph of the British Fossil Elephants. *Palæontographical Soc.*, 1877-81. [Irish localities.]

5 —

On the Recent and Extinct Irish Mammals. *Sci. Proc. R.D.S.*, n.s. II., 45—86, plates 1—5. (read 1878). 1880.

6 —

Report on the History of Irish Fossil Mammals. *Proc. R.I.A.*, (2) III. (*Science*), 89—100. 1878. [“Abridgement of the Report.”]

—

See **Ussher (678, 679, 680).**

7 Adams (A. Leith) S. Haughton, W. Boyd Dawkins, and John Evans.

First Report of the Committee appointed for the Purpose of exploring the Caves of the South of Ireland. *Brit. Assoc. Report for 1880*, 209—211. 1880. [Consists of a report from R. J. USSHER and a letter from R. DAY on Carrigower.]

8 — — — —

Second Report do. do. do. *Brit. Assoc. Report for 1881*, 218—221. 1882. [Report from R. J. USSHER.]

9 Adams (A. Leith), G. H. Kinahan, and R. J. Ussher.

Explorations in the Bone Cave of Ballynamindra, near Cappagh, County Waterford. *Sci. Trans. R.D.S.*, n.s. I., 177—266, plates 11—14. 1881. [Full descr. of deposits and fossils.]

10 Agassiz (Louis).

On Glaciers, and the evidence of their having once existed in Scotland, Ireland, and England. *Proc. Geol. Soc. Lond.*, III. ii., 327—332. 1840-41. [Brief ref. to Irish striated rocks.]

11 —

The Glacial Theory and its recent Progress. *Edinb. New Phil. Journ.*, XXXIII., 217—283. 1842. [Brief ref. to Irish erratics, p. 223.]

12 Ainsworth (W.).

An Account of the Caves of Ballybunian, Co. Kerry, with some mineralogical Details. 96 pp. 8vo. Dublin, 1834. [Descr.]

13 Allman (G. J.).

Notice of erratic blocks of greenstone, occurring in the neighbourhood of Bandon, County Cork. (Abstract.) *Journ. G.S.D.*, III., 242. 1847.

14 Andrews (Mary K.).

Denudation at Cultra, Co. Down. *I.N.*, II., 16—18, 47—49, plate. 1893; and *Proc. B.N.F.C.*, (2) III., 529—532, plate (for 1892-93), 1893. [Post-glac. denudation.]

15 Andrews (Thomas).

On some Caves in the Island of Rathlin and the adjoining Coast of the County of Antrim. *Brit. Assoc. Report for 1834*, 660. 1835. [Short abstract: general descr.]

16 —

On the Composition of an Inflammable Gas Issuing from below the Silt-Bed of Belfast. *Proc. B.N.H. & P.S. for 1873-74*, 93—94. 1874.

17 Andrews (W.).

On Oyster Deposits. *Journ. R.G.S.I.*, II., 13—15. (read 1867). 1871. [Those of Kenmare river are quite recent.] [For discussion on this paper see same vol., p. 132.]

Anon.

A Philosophical Survey of the South of Ireland . . . (1788), see **Campbell (755)**.

A Tour through Ireland . . . (1780), see **Luckombe (760)**.

Excursions through Ireland [1818], see **Cromwell (754)**.

18 —

Fossil Deer of Ireland. *Dublin Phil. Journ. & Scient. Review*, I., 478—486. 1825; reprinted in *Annals of Philosophy*, n.s. XI., 305—312. 1826. [Edit. notes, and extracts from Maunsell (503) and Hart (266).]

19 —

Kingston Cave. *Dublin Penny Journ.*, II., No. 61, 65—66. Aug. 31, 1833. [Discovery and descr. of Mitchelstown cave.]

20 —

Stalactite Cavern at Mitchelstown. *Dublin Penny Journ.*, III., No. 130, 201—208, maps. Dec. 17, 1834. [Ed. note: letter from Dr. Nichol: anon. letter: paper by Dr. Apjohn, reprinted (28).]

21 —

Remarkable Discovery of Fossil Remains. *Farmer's Gazette*, V., 487, Nov. 28, 1846. Reprinted in *Zool.*, V., 1593—1595, 1847, under the title "Discovery of the Bones of Deer and Cattle at Lough Gur." [Descr. of Lough Gur find by an eye-witness.]

22 —

Ancient Lake-habitations of Switzerland and Ireland. *Ulst. Journ. Arch.*, VII., 179—194. 1859. [Descr. of several Irish crannogs.]

23 Anon.

Human Remains. *Geologist* for 1862, 353. [Human body in gravel below 11 feet of bog, Earl of Moira's estate, Co. Down].

24 —

[Skeleton and horns of Irish deer in "soil" at bottom of pond, Fethard, Co. Tipperary]. *Dublin Evng. Telegraph*, Nov. 6, 1884.

25 —

Finds of Elkheads, &c. [Note.] *Proc. & Papers R.S.A.I.*, (5) I., (1890-91), 485. 1892. [At Cappagh Bog, Adare, Co. Limerick.]

26 —

General Guide to the Science and Art Museum, Dublin. 8vo. Dublin, 1892. [Preface by V. Ball.] [List with locs. of Fossil Mammals of Ireland, pp. 23-25.]

27 Antisell (T.).

Irish Geology, in a series of chapters, containing an outline of the science of Geology, and a description of the various rocks distributed on the surface of the Island, with some remarks on the climate. 84 pp. 12mo. Dublin, 1846. [Chap XI., Tertiary system.]

28 Apjohn (J.).

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30 Atkinson (George M.).

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31 Baily (William Hellier).

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41 Barker (John).

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[Flint-flakes from near Carrickfergus.]

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[Ref. to Woodburn boulder clay and fossils.] *4th Ann. Report* (for 1866-67), 16. 1867.

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[Flint implements.]
- 62** —
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- 63** —
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- 64** —
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89). 1889.
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- 94 Benn (Edward).**
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- 96 —**
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126 Charnock (R. S.).

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127 Clarke (Dr. —).

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128 Close (Rev. Maxwell H.).

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- 137 —**
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- 142 Coleman (James).**
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- 144 Conwell (Eugene A.).**
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- 145 Cork Naturalists' Field Club.**
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- 146 Cox (Robert).**
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- 147 Croker (Thomas Crofton).**
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- Cromwell (T. K.)**, see **757**.
- Crosskey (Henry William)**, see **Brady, &c. (104)**.
- 148 Cruise (Richard J.).**
Explanatory Memoir to accompany sheets 89 and 90 of the Maps of the Geological Survey of Ireland, illustrating parts of the counties of Longford, Westmeath, and Meath. 8vo. 1872. [Glac. & post-glac. 24—26.]

149 Cruise (Richard J.).

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152 Cusack (M. F.).

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154 Dawkins (W. Boyd).

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158 Day (Robert).

[Flint Implements from Toome, Co. Antrim.] *Journ. Kilk. Arch. Soc.*, V. ii., 226—228. 1865.

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162 Deneley (Thomas).

[Extracts from his Journal.] *Journ. Kilk. Arch. Soc.*, V. iii., 441. 1866. [Irish elk finds.]

163 Denny (Henry).

On the Claims of the Gigantic Irish Deer to be considered as contemporary with Man. *Proc. Geol. & Polytechnic Soc. of W. Riding of Yorks.*, III. (1845-59), 400—440 (read 1855). 1859. [Full paper.]

164 —

Observations on the Distribution of the extinct Bears of Britain, with especial reference to a supposed new Species of Fossil Bear from Ireland. *Proc. Geol. & Polytechnic Soc. of W. Riding of Yorks.*, IV. (1859-68), 338—358, plate 10 (read 1864). 1869. [Brenan's Shandon specimens]

165 Dickie (George).

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166 Dickson (John Mitchell).

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167 Dixon (Robert V.).

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168 Donovan (—).

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169 Drummond (James L.).

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170 Dunne (Right Hon. Major-Gen. F. P.).

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171 Du Noyer (George Victor).

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174 —

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175 —

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179 —

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180 —

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181 —

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184 Du Noyer (George Victor) and J. Beete Jukes.

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186 Egan (F. W.).

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187 —

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188 —

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189 —

Do. do. sheet 27 do. do., including . . . [parts of] Londonderry . . . Tyrone, and . . . Antrim. 8vo. 1881. [Phys. geogr. 7—9; glac. & post-glac. 35—40; striæ 43—44.]

190 —

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191 —

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— See **Hull (307), Kinahan (433), Nolan (528, 529), Symes (649), Traill (667), Wilkinson (718).**

192 Egan (F. W.), J. R. Kilroe, and W. F. Mitchell.

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193 Enniskillen (Earl of).

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194 Evans (John).

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See **Adams (7, 8).**

196 F. (J.).

Ancient Iron Fetters. *Ulst. Journ. Arch.*, VI., 168—169. 1858. [Stone crannog submerged in Port Lough near Londonderry.]

197 Firth (William A.) and William Swanston.

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198 Foot (Arthur Wynne).

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199 Foot (Frederick J.)

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201 —

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202 —

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203 —

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See **Foot (758), Jukes (346, 347), Kinahan (425, 426).**

205 [Foot (Frederick J.), and J. Beete Jukes.]

Explanations to accompany sheets 131 and 132 of the maps of the Geological Survey of Ireland, illustrating part of the County of Clare. 8vo. 1860. [Glac. & post-glac. 20—21. Marl shells.]

206 [Foot (Frederick J.) and George Henry Kinahan.]

Do. do. sheet 133 do. do. illustrating a portion of the County of Clare. 8vo. 1862. [Glac. & post-glac. 32—34. *Megaceros*.]

207 [Foot (Frederick J.), J. Beete Jukes, and Richard Glascott Symes.]

Do. do. sheets 96, 97, 106, and 107 do. do., illustrating parts of the counties of Galway and Roscommon. 8vo. 1867. [Glac. & post-glac. (eskers chiefly) 23—38; marl shells.]

208 Foot (Frederick J.) and J. O'Kelly.

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209 [Foot (Frederick J.), J. O'Kelly, and J. Beete Jukes.]

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211 Frazer (William).

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213 Geikie (James).

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215 Geinitz (H. B.).

On the *Cervus* (*Megaceros*) *Hibernicus*, from the County of Limerick in the Royal Museum at Dresden. *Journ. G.S.D.*, IX., 339—343 (read 1861). 1862. [Descr.; table of dimensions; discussion.]

216 Geological Society of Dublin.

[Reindeer head and horns found near Ashbourne, Co. Dublin, exhibited.] *Journ. G.S.D.*, X., 70. (1862). 1864.

217 Geological Survey of Ireland: Maps.

205 coloured sheets, 1855-1890. [Drift, raised beach, alluvium, bog, are marked.]

Geological Survey of Ireland: Memoirs.

See **Cruise** (148 to 152), **Du Noyer** (173 to 175, 178), **Egan** (186 to 192), **Foot** (200 to 202, 205 to 209), **Hardman** (257, 259), **Hull** (295, 300, 301, 304 to 311), **Jukes** (322, 327, 328, 334 to 360), **Kilroe** (369), **Kinahan** (371, 376, 382, 407, 411, 424 to 434), **Leonard** (469, 470), **Mitchell** (505, 506), **Nolan** (525 to 529), **O'Kelly** (531 to 533), **Symes** (645 to 655), **Traill** (667), **Wilkinson** (716 to 721), **Wynne** (736, 742).

218 Glennon (Richard).

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224 —

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225 Graves (Rev. James).

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226 Gray (William).

On *Megaceros hibernicus* [abstract]. *Report B.N.F.C. for 1864-65*, 7. 1865; and *Geol. Mag.*, II., 134. 1865. [Spec. found at Island Magee.]

227 Gray (William).

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228 —

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Notes on the rudely-worked Flakes of Antrim and Down—their character, distribution, and similarity to specimens from England, Scotland, and the Continent. *Proc. B.N.F.C.*, (2) I., 108-113 (for 1874-75). 1875.

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Opening Address. *Proc. B.N.F.C.*, (2) I., 343-348 (for 1878-79). 1879. [Caves. Implements.]

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237 —

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238 —

Worked Flints, ancient and modern. *Proc. B.N.F.C.*, (2) III., 548-569, 8 plates (for 1892-93). 1893.

239 Green (A. H.)

Notes on the Geology of Part of Co. Donegal, Ireland. *Geol. Mag.*, VIII., 553-561. 1871. [Refs. to glaciation.]

240 Griffith (Sir Richard).

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248 [Halley (E.)].

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251 Hardman (Edward T.).

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311 — — —

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334 [Jukes (Joseph Beete) and George Victor Du Noyer].

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337 [— —]

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- 345** [— — —]
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- 346** [**Jukes (Joseph Beete) and Frederick J. Foot.**]
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- 347** [— — —]
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- 348** [**Jukes (Joseph Beete) and G. H. Kinahan.**]
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- 349** [— — —]
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- 351** [**Jukes (Joseph Beete), G. H. Kinahan, and G. V. Du Noyer.**]
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do. 8vo. 1859. [Kilkenny, Carlow, Queen's Co., Kildare.
Denudation 5—8; sections 25—48; glac. and post-glac. 49—51.]
- 352** [**Jukes (Joseph Beete), G. H. Kinahan, and J. O'Kelly.**]
Do. do. sheets 197 and 198, and the south-east part of 191
do. do., illustrating part of the Counties of Cork and Kerry.
8vo. 1860. [Glac. & post-glac. 28—29.]
- 353** [**Jukes (Joseph Beete), G. H. Kinahan, and A. B. Wynne.**]
Do. do. sheet 144 do. do., illustrating parts of the
Counties of Limerick, Tipperary, and Clare. 8vo. 1860. [Glac.
& post-glac. 34—36: *Megaceros*.]
- 354** [**Jukes (Joseph Beete), and J. O'Kelly.**]
Do. do. sheet 154 do. do., illustrating part of the
Counties of Limerick and Tipperary. 8vo. 1861. [Glac. &
post-glac. 27.]
- 355** [**Jukes (Joseph Beete), and A. B. Wynne.**]
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20—21: *Megaceros*.]

356 [Jukes (Joseph Beete), and A. B. Wynne.]

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357 [— —]

Do. do. sheet 188 and 189 do. do., illustrating parts of the Counties of Cork and Waterford. 8vo. 1861. [Glac. & post-glac. 20—21.]

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371 Kinahan (George Henry).

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373 —

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388 —

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390 —

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391 —

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393 Kinahan (George Henry).

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402 —

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***418 [—] [Nanahik, Pseudonym].**

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420 Kinahan (George Henry).

Economic Geology of Ireland. [Being vol. VIII. of *Journ. R.G.S.I.*] Svo. Dublin, 1889. [Ref. to clays, &c.]

421 —

Kitchen Middens in co. Donegal. *I.N.*, III., 138. 1894. [General note.]

422

The Recent Irish Glaciers. *I.N.*, III., 236—240. 1894. [Effects of heavy snow-drifts against crumbling cliffs.]

423 —

Kitchen Middens, co. Donegal. *I.N.*, IV., 21. 1895. [Short note.]

See **Adams (9)**, **Foot (206)**, **Hull (307)**, **Jukes (348 to 353, 359)**, **Kinahan (760)**, **Trench (668)**, **Ussher (681, 681)**.

424 [Kinahan (George Henry) and J. Beete Jukes].

Explanations to accompany sheet 143 of the maps of the Geological Survey of Ireland, illustrating part of the Counties of Clare and Limerick. Svo. 1860. [Glac. & post-glac, *Megaceros*, 8—9, 33—34.]

425 [Kinahan (George Henry), J. Beete Jukes, and F. J. Foot.]

Do. do. sheet 152 do do., illustrating part of the Counties of Kerry and Limerick. Svo. 1860. [Glac. & post-glac. 26—27.]

426 [Kinahan (George Henry) and F. J. Foot.]

Do. do. sheet 142 do. do., illustrating parts of the Counties of Clare, Kerry, and Limerick. Svo. 1860. [Glac. & post-glac. 39—40.]

427 Kinahan (George Henry), H. Leonard and R. J. Cruise.

Explanatory Memoir to accompany sheets 104 and 113 with the adjoining portions of sheets 103 and 122 (Kilkieran and Aran sheets) do. do., illustrating a portion of the County of Galway. Svo. 1871. [Glac. & post-glac., sea-cliffs (Aran) 31—37; glac. & post-glac. (mainland), kitchen-middens 69—74; table of striæ 75—85.]

428 Kinahan (George Henry), and Joseph Nolan.

Explanation to accompany sheet 95 do. do. . . . illustrating parts of the counties of Galway and Mayo. Svo. 1870. [Lough Corrib islands 30—36; L. Mask islands 45; glac. & post-glac. 45—52; table of striæ 53—58.]

429 Kinahan (George Henry), J. Nolan, H. Leonard, and R. J. Cruise.

Explanatory Memoir to accompany sheets 93 and 94, with the adjoining portion of sheets 83, 84, and 103 do. do., illustrating the geological structure of the district around Clifden, Connemara. Svo. 1878. [Drift bar 13; denudation 44—47; glac. & post-glac. 143—144; table of striæ 145—160.]

430 [Kinahan (George Henry), J. O'Kelly, and J. Beete Jukes.]

Explanation to accompany sheet 153 do. do., illustrating parts of the Counties of Limerick and Cork. Svo. 1861. [Glac. & post-glac. 28]

431 Kinahan (George Henry) and R. G. Symes.

Explanatory Memoir to accompany sheets 86, 87, 88, and eastern part of 85 do. do., illustrating parts of the counties of Mayo, Galway, Roscommon, and Longford. 8vo. 1871. [Frontispiece, eskers; form of ground 7-9; glac. & post-glac. 49-54; striae 39, 55-57.]

432 Kinahan (George Henry), R. G. Symes, S. B. Wilkinson, Joseph Nolan, and H. Leonard.

Do. do. sheets 73 and 74 (in part), 83 and 84 do. do. including the Country around Westport, &c. 8vo. 1876. [Glac. & post-glac. 11, 69-75; table of striae 75-82.]

433 Kinahan (George Henry), S. B. Wilkinson, J. Nolan, F. W. Egan [and E. Hull].

Do. do. sheet 17 and S. E. portion of sheet 11 do. do. 8vo. 1889. [Donegal, Derry, Tyrone. Phys. geogr. 5-6; glaciation 28; glac. & post-glac. 28-32.]

434 [Kinahan (George Henry), A. B. Wynne and J. Beete Jukes.]

Explanations to accompany sheet 134 do. do., illustrating parts of the counties of Clare, Tipperary, and Limerick. 8vo. 1861. [Glac. & post-glac., *Megaceros*, 8-9, 29-31.]

435 Kinahan (Gerard A.).

"Black Sand" in the Drift north of Greystones, Co. Wicklow. *Sci. Proc. R.D.S.*, n.s. III., 165-168. 1883; and *Journ. R.G.S.I.*, VI., 111-114 (read 1881). 1886.

436 —

Some Notes on the Geology of Bray Head, with a Geological Map and Sections. *Journ. R.G.S.I.*, VI., 188-192, plate 7 (read 1882). 1886. [Ref. to glac. phenomena.]

437 Kinahan (John Robert).

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Three Days among the Bats in Clare. *Proc. Dublin Nat. Hist. Soc.*, III. (for 1859-62), 94-99 (read 1861). 1863. [Description of several caves.]

439 King (Prof. William).

An Attempt to correlate the Glacial and Post-glacial Deposits of the British Islands, and to determine their order of succession. *Geologist* for 1863. 168-178. 1863. [Refs. to Ireland.]

440 King (Right Rev. Dr. William), Archbishop of Dublin.

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441 Knowles (William James).

Works of Art found in the Boulder Clay at Cullybackey [abstract]. *7th Ann. Report B.N.F.C.* (1869-70), 35-36. 1870. [Co. Antrim. Concretionary nodules, and piece of wood supposed to be wrought.]

442 Knowles (William James).

On Prehistoric Remains at Portstewart. *Proc. B.N.F.C.*, (2) 1., 100 (for 1874-75). 1875. [Sand-hill finds.]

443 —

A Glimpse of Prehistoric Times in the North of Ireland. *Brit. Assoc. Report for 1874, Sections*, 155—156. 1875. [Implements, bones.]

444 —

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445 —

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446 —

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452 —

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453 —

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455 Knowles (William James).

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465 —

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466 —

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467 Lentaigne (John).

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468 Leonard (Hugh).

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469 Leonard (Hugh).

Explanatory Memoir to accompany sheets 68 and 69 of the Maps of the Geological Survey of Ireland, illustrating parts of the Counties of Cavan, Leitrim, and Rosecommon. 8vo. 1878. [Roches moutonnées 11; glac. & post-glac. 21—22.]

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See **Kinahan (427, 429, 432)**.

Leonard (W. B.), see **Hull (308, 310, 311)**.

470 Leonard (W. B.), and R. J. Cruise.

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471 Leslie (David).

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472 Lett (Rev. Henry William).

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Ancient Canoe found near Loughbrickland, Co. Down. *Ulst. Journ. Arch.*, n.s. I., 153—154. 1895.

474 Lewis (Henry Carvill).

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A Topographical Dictionary of Ireland. 2 vols., 4to. 1837. [*Megaceros* at Dromore, Co. Down, I., 578.]

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480 Lubbock (Sir John).

Prehistoric Times 8vo. London, 5th edition. 1890. [General ref. to Ireland.]

Luckombe (Philip), see **761**.

481 Lydekker (Richard).

Catalogue of the Fossil Mammalia in the British Museum, in 5 parts. 8vo. London, 1885-87. [Contains Irish localities, as in II., 82-89, *Cervus giganteus*.]

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483 L[ynch] (J. F.).

Lough Gur. *Journ. Cork Hist. and Arch. Soc.* (2) I., 241-258, 289-302. 1895. [Descr. and ref. to animal remains.]

484 MacAdam (James).

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485 —

Observations on the Neighbourhood of Belfast, with a Description of the Cuttings on the Belfast and Co. Down Railway. *Journ. G.S.D.*, IV., 250-265, plate 1. 1850. [Chiefly glac. & post-glac.]

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488 M'Clay (James L.).

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489 M'Evoy (D.).

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See **Hull (307, 309)**, **Symes (649, 651, 652, 655)**.

493 M'Henry (Alexander), and W. W. Watts.

Guide to the Collections of Rocks and Fossils belonging to the Geological Survey of Ireland, arranged in Room III. E. of the Museum of Science and Art, Dublin. 8vo. Dublin. 1895. [General descr. of glac. & post-glac. beds, by provinces : lists of fossils.]

494 M'Intosh (D.).

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495 M'Skimin (Samuel).

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496 Mahony (James A.).

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499 —

[Annual] Address [to Geol. Soc. of Dublin.] *Journ. G.S.D.*, III., 215—235. 1847. [Review of papers read.]

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See also **763.**

501 Mantell (Gideon Algernon).

On the Remains of Man and Works of Art embedded in Rocks and Strata, as illustrative of the connection between Archæology and Geology. *Archæological Journal*, VII., 327—346. 1850. [Contemporaneity of Man and *Megaceros*.]

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503 Maunsell (Archdeacon William Wray).

[Letters to R.D.S. on presentation of Elk's bones.] *Proc. R.D.S.*, LX., 169—170, 211—212, 1824; LXI., 93—97, 1825. [Localities, &c.]

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505 Mitchell (W. F.).

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See **Egan (192)**, **Hull (306, 307)**.

507 Molloy (Kyran).

[Letter on a timber structure below 4 feet of bog.] *Journ. R.H. & A.A.I.*, (4) I. i., 279. 1870. [Clonmacnoise, King's Co.]

508 Molyneux (Thomas).

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Remarks upon the aforesaid Letter [see **Neville (533)**] and Teeth. *Phil. Trans.*, XXIX. (1714-16), 370—384, plate. 1717.

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See **Boate (100)**.

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512 Moore (Joseph Scott).

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516 Morant (George).

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Journ. Kilk. & S.E. of Ireland Arch. Soc., VI. (1867), 8—10.
 1871.

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518 Moss (Richard J.).

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 (*Science*), 547—552. 1875-77. [Descr., list of bones.]

519 Mudge (Capt. William).

Description of an ancient Structure dug out of Drumkelin Bog, in the
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520 Mulvany (William T.).

Collection of antiquities presented to the Royal Irish Academy. *Proc.
 R.I.A.*, V. (1850-53), appendix V., 1853. [Some skulls, &c. in-
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521 Murray (William).

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Nanahik (*Pseudonym*) see **Kinahan (418).**

522 Neville (Francis).

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 (100). [Elephant's teeth at Maghery, borders of Cavan and
 Monaghan.]

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 V., 1629-1633. 1847. [Editorial comments following letters by
 Owen (550) and Richardson (597, 598), on the Lough Gur
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524 Nichol (A.).

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525 Nolan (Joseph).

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 Geological Survey of Ireland, including the country around
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 Louth. Caves 10: glac. & post-glac. 33—34.]

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527 Nolan, (Joseph).

Do. do. sheet 26 do. do., comprising portions of the Counties Tyrone and Londonderry. 8vo. 1884. [Phys. geogr. 7-9; glac. & post-glac. 21-24.]

See **Hull (307, 309), Kinahan (428, 429, 432, 433).**

528 Nolan (Joseph) and F. W. Egan.

Do. do. sheet 18 do. do. 8vo. 1881 [Derry and Tyrone. Phys. geogr. 7-10; glac. & post-glac. 23-24.]

529 ———

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Hitherto unnoticed Crannogs in Lough Bridgid, Co. Clare. *Proc. and Papers R.S.A.I.*, (5) I. (1890-91), 487. 1892.

531 [O'Kelly (J.).]

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See **Foot (208, 209), Jukes (343, 352, 354, 360), Kinahan (430).**

533 [O'Kelly (J.), J. Beete Jukes, A. B. Wynne, and G. V. Du Noyer.]

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534 O'Laverty (Rev. James).

Relative Antiquity of Stone and Bronze Weapons. *Ulst. Journ. Arch.*, V., 122-127. 1857.

535 Oldham (Thomas).

On the more recent Geological Deposits of Ireland. *Journ. G.S.D.*, III., 61-71. 1844. [Good general descr.; list of Howth glac. shells.]

536 ———

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539 Oldham (Thomas).

On the supposed existence of Moraines in Glenmalur, Co. of Wicklow. *Journ. G.S.D.*, III., 197—199. 1846. [Believes them to be tidal bars.]

540 —

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[Annual] Address [to Geol. Soc. Dublin.] *Journ. G.S.D.*, III., 273—300. 1848. [Review of papers read.]

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544 O'Reilly (J. P.).

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545 Ormsby (M. H.).

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547 Owen (Richard).

Report on the British Fossil Mammalia, Part II., Ungulata. *Brit. Assoc. Report for 1843*, 208—241. 1844. [Ref. to Irish remains.]

548 [—]

Description and illustrated catalogue of the Fossil organic remains of Mammalia and Aves contained in the Museum of the Royal College of Surgeons of England. 4to. 1845. [Irish localities, as at pp. 255—261, *Megaceros Hibernicus*.]

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560 Phayer (J. R.).

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634 Stewart (Samuel Alexander).

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647 —

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648 —

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— see **Kinahan (431, 432).**

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Do. do. sheet 54 and the south-western portion of sheet 42 do. do., including the country around Easky, &c., in the Counties of Sligo and Mayo. 8vo. 1880. [Glac. & post glac. 15—16.]

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652 Symes (Richard Glascott), William A. Traill, and Alexander M'Henry.

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665 Tighe (William).

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682 Wakefield (Edward).

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685 Wakeman (W. F.).

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691 —

[On iron tools, &c. from Cornagall Crannog, Co. Cavan.] *Journ. R.H. & A.A.I.*, I. ii., 461—466, plate. 1871. [Refs. to other crannogs.]

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Watts (W. W.), see **M'Henry (493)**.

701 Wauchope (Admiral R.)

Remarks on the Flint Implements found at Amiens and Abbeville, in connection with the Glacial Theory. Svo. Penrith, 1861. [Reviewed in *Geologist*, 1861, 272. Stone hatchet buried in *Megaceros* skull, Lough Gur. See also **684**.]

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Stone Weapon in a Fossil Deer's Skull. *Geologist for 1861*, 381—382. [At Lough Gur, and in Co. Carlow.]

703 Weaver (Thomas).

On the fossil elk of Ireland. *Phil. Trans.*, CXV., 429—435. 1825 ;
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705 Westropp (T. J.).

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Svo. Dublin, 1857.

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On the ancient and modern races of Oxen in Ireland. *Proc. R.I.A.*,
VII. (1857-61), 64—75 (read 1858). 1862; and *Nat. Hist.*
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other animals.]

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Bronze in the Museum of the Royal Irish Academy. Svo.
Dublin, 1861.

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716 Wilkinson (Sydney B.) and R. J. Cruise.

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Further Remarks on the Sequence of the Glacial Beds. *Geol. Mag.*, VIII., 406—412. 1871. [Ref. to Wexford beds.]
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- 731 —**
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- 733 Wright (Edward Perceval).**
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- 735 —**
The Occurrence of Boulder Clay on Divis. *Proc. B.N.F.C.*, (2) IV. 215—216 (for 1894-95). 1895. [Marine clay at 1300—1400 feet, Co. Antrim.]
- 736 Wynne (Arthur B.).**
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- 738 —**
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See **Jukes (343 to 345, 355 to 360), Kinahan (434), O'Kelly (533).**

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Traces of Ancient Dwellings in the Sandhills of West Kerry. [Note.] *Journ. R.S.A.I.*, (5) III., 78-80. 1893. [Bones, &c.]

Young (Arthur), see **767.**

745 Young (Robert).

On the Eskers of the Central Plain of Ireland. *Brit. Assoc. Report for 1852, Sections*, 63-64. 1853. [Submergence theory.]

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—
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 cave, p. 106.]

755 Carpenter (George Herbert).

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756 Close (Rev. Maxwell H.).

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 &c."] [Deser. of beds underlying the city.]

757 [Cromwell (Thomas Kitson).]

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 more cave, II., p. 58.]

758 Foot (Frederick J.).

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759 Hardman (Edward T.).

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 [Localities.]

760 Kinahan (George Henry) and M. H. Close.

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761 [Luckombe (Phillip).]

A Tour through Ireland, wherein the present state of that Kingdom is
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 and Kerry, pp. 130—131, 134, 190, 282.]

762 Mallet (Robert).

On some Stalagmites from the Cave of Dunmore, County of Kilkenny.
Journ. G.S.D., III. iii., 262—263. 1846. [Short abstract.]

763 Ryland (Rev. R. H.).

The History, Topography, and Antiquities of the County and City of
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764 Savage (John).

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 of a bog at Dunmore, North Galway, p. 264.]

765 White (Rev. P.).

History of Clare 8vo. Dublin, 1893. [Cave at Kil-
 tannon, p. 2.]

766 Wood-Martin (Lt.-Col. W. G.).

History of Sligo, County and Town. [Vol. III]. 1688 to present
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 clay, bogs, raised beaches, crannogs, caves.]

See **Hardman (759)**.

767 Young (Arthur).

A Tour in Ireland made in the Years 1776, 1777, and
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 cave, 380—381 (I., 464—465 of Hutton's ed., 1892).]

GROUP 4—GLACIAL DEPOSITS, ERRATICS.

11	13	47	48	51	56	57	62	65	66	67	69	72	73
76	77	78	81	84	87	88	89	97	108	110	111	132	137
138	139	171	172	173	174	175	176	213	214	222	224	242	243
246	250	253	254	255	258	272	290	291	293	302	314	320	327
328	336	338	339	344	345	350	365	366	368	373	374	375	378
387	388	389	392	393	394	398	399	402	404	406	407	414	415
419	435	437	441	462	474	484	488	494	537	538	539	541	542
568	575	583	587	589	590	591	593	603	604	612	620	622	625
626	627	628	629	631	637	638	641	642	644	659	660	661	666
706	728	729	735	737	738	740	745	747	748	750	757	760	766

GROUP 5—POST-GLACIAL IN GENERAL.

31	389	399	440	487	544	569	570	576	588	621	635	734	751
756	766												

GROUP 6—SUBMERGED PEAT, BOGS, MARL.

16	21	23	25	36	37	40	42	50	59	67	143	165	169
185	197	205	207	211	218	245	286	308	319	364	376	382	400
416	483	495	502	513	514	518	519	521	546	552	559	566	579
596	620	623	630	682	724	739	740	743	748	764			

GROUP 7—POST-GLACIAL CLAYS.

64	220	221	400	551	576	577	578	581	582	616	636	643
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GROUP 8—RAISED BEACHES.

29	50	52	58	64	71	75	83	91	165	180	221	222	237
252	273	292	295	304	315	397	453	457	515	554	574	577	584
615	618	639	643	732	748								

GROUP 9—CAVES AND CAVE-DEPOSITS.

2	7	8	9	12	15	19	20	28	55	79	101	102	103
105	106	107	109	120	142	145	147	149	152	155	198	199	202
231	256	267	296	371	376	438	510	511	524	525	551	562	563
564	565	601	602	607	608	645	665	670	671	673	674	676	678
679	680	687	688	689	726	727	732	733	742	754	755	756	757
758	759	761	762	763	765	766	767						

GROUP 14—DENUDATION, DEPOSITION, FORMATION OF SEA-BEACHES AND LAGOONS.

14	205	319	351	383	390	391	397	398	401	403	408	409	410
411	417	418	422	427	429	574	640	733					

GROUP 15—ELEVATION, SUBSIDENCE, SUBMERGENCE.

70	127	177	247	303	416	472	546	606	617	634	635	672	677
681	740	741	743	746	748								

GROUP 16—CLIMATE OF PAST EPOCHS.

182	210	213	605
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SECTION B—GEOGRAPHICAL INDEX.

1—GENERAL OR INDEFINITE.

(Papers dealing with many localities, or with general considerations.)

3	4	5	6	10	11	18	22	26	27	34	36	37	39
41	85	88	90	92	94	95	99	100	108	114	116	118	119
122	129	140	143	153	154	156	157	162	163	164	168	177	182
193	195	210	213	214	217	218	222	223	227	230	231	232	238
240	241	242	244	246	249	250	253	255	264	266	268	269	281
283	284	285	287	288	290	291	292	293	294	296	297	303	318
320	321	323	324	329	332	333	361	362	364	366	367	368	370
373	374	378	383	385	386	387	388	389	390	391	392	393	394
395	397	399	401	404	405	406	407	409	413	415	419	420	422
439	443	446	447	448	452	453	454	457	458	459	460	461	463
466	467	472	474	479	480	481	482	493	494	498	499	501	503
508	513	520	523	534	535	537	538	542	547	548	549	553	558
569	571	573	574	581	582	586	587	588	589	590	594	596	599
600	605	606	607	609	610	611	613	617	622	625	634	635	638
656	659	660	661	662	664	673	674	675	676	682	693	697	708
709	710	711	713	714	723	724	725	730	732	739	743	745	

2—Co. ANTRIM.

15	16	29	31	43	45	46	47	49	50	51	52	53	54
56	59	62	63	64	66	67	70	75	76	77	80	83	91
96	104	109	110	111	112	113	115	126	158	159	180	181	183
190	191	194	197	212	220	221	224	226	228	229	232	233	234
235	236	237	251	254	257	258	273	295	310	312	313	314	317
396	411	441	445	447	449	451	453	454	455	457	462	464	476
477	478	484	485	486	487	490	491	492	495	497	500	502	515
572	577	578	579	580	583	587	592	604	618	621	623	624	635
636	637	639	641	643	644	647	649	651	694	696	699	700	712
734	735	746	747	749	750	751	752	753					

3—Co. ARMAGH.

150	151	186	187	188	189	194	251	257	525
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4—Co. CARLOW.

259	305	322	351	414	702
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5—Co. CAVAN.

248	251	261	469	470	504	509	522	653	658	691	715	717	719
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6—Co. CLARKE.

199	202	205	206	353	371	376	424	426	434	438	530	705	706
758	765												

7—Co. CORK.

1	7	13	17	30	105	140	141	142	145	147	152	175	262
265	319	327	328	336	338	340	344	349	350	352	355	357	358
430	575	620	670	726	727	739	740	741	761				

8—Co. DONEGAL.

44	192	239	251	270	271	272	306	307	309	416	417	421	423
433	440	465	496	497	519	557	584	616	648	704	718		

9—Co. DOWN.

14	23	45	48	57	60	61	65	68	69	71	72	73	74
78	81	82	165	166	169	183	186	197	229	232	251	275	301
310	311	398	450	473	475	485	486	487	554	555	556	576	578
585	592	633	635	636	637	666	667	703	734	748			

10—Co. DUBLIN.

32	33	121	124	128	132	133	136	137	138	139	171	173	174
216	260	290	298	299	300	304	337	342	365	437	518	540	543
544	567	568	591	593	612	615	622	626	627	629	722	723	724
756													

11—Co. FERMANAGH.

42	55	79	150	151	161	251	277	278	279	562	563	564	565
566	648	653	684	685	686	687	688	689	690	692	693	695	717
719	720	721											

12—Co. GALWAY.

97	202	207	208	251	330	371	372	376	377	379	380	381	382
384	402	427	428	429	431	432	468	532	545	546	559	657	760
764													

13—Co. KERRY.

12	35	131	143	172	175	201	211	289	328	335	336	339	341
346	347	349	352	359	425	426	603	744	761				

14—Co. KILDARE.

173	174	184	300	343	348	351							
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15—Co. KILKENNY.

134	178	198	200	209	256	267	286	322	334	351	489	510	551
560	601	602	665	698	754	755	762						

16—KING'S Co.

170	184	208	245	343	356	507	532	632	736				
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17—Co. LEITRIM.

149	251	369	469	470	653	712	717	742					
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18—Co. LIMERICK.

21	25	40	98	121	123	125	146	160	215	219	280	344	349
353	354	355	424	425	426	430	434	483	550	597	598	701	702

19—Co. LONDONDERRY.

86	135	176	189	190	191	196	247	251	272	274	315	433	440
442	444	446	448	449	456	488	527	528	529	572	578	595	616
624	637	642	649	734									

20—Co. LONGFORD.

40	148	203	204	208	251	325	326	331	431	470	712		
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21—Co. LOUTH.

58 138 251 304 308 525 570

22—Co. MAYO.

97 149 242 243 251 428 431 432 505 645 646 650 652 654
655 666 716 760

23—Co. MEATH.

144 148 171 173 174 179 184 251 304 308 337 470 614 669
683 684 707 731

24—Co. MONAGHAN.

150 151 188 248 251 308 471 509 516 517 522 525 719

25—QUEEN'S Co.

170 200 276 343 348 351 356 375 531 532 668 736

26—Co. ROSCOMMON.

149 207 208 251 363 431 469 470 716

27—Co. SLIGO.

149 242 251 369 608 650 654 737 738 742 759 766

28—Co. TIPPERARY.

19 20 24 28 178 200 209 334 344 345 353 354 356 358
360 376 434 511 524 532 533 668 682 733 736 755 767

29—Co. TYRONE.

151 167 189 192 251 257 417 433 521 526 527 528 561 663
718 720 721

30—Co. WATERFORD.

2 7 8 9 101 102 103 106 107 120 127 155 178 252
282 345 357 358 619 671 672 677 678 679 680 681 763

31—Co. WESTMEATH.

38 148 184 185 208 225 251 630 631

32—Co. WEXFORD.

87 88 89 90 178 259 263 305 316 322 400 403 408 409
412 414 552 728 729

33—Co. WICKLOW.

33 128 137 139 259 300 302 305 342 409 410 418 435 436
506 512 514 536 539 541 591 593 622 628 640

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